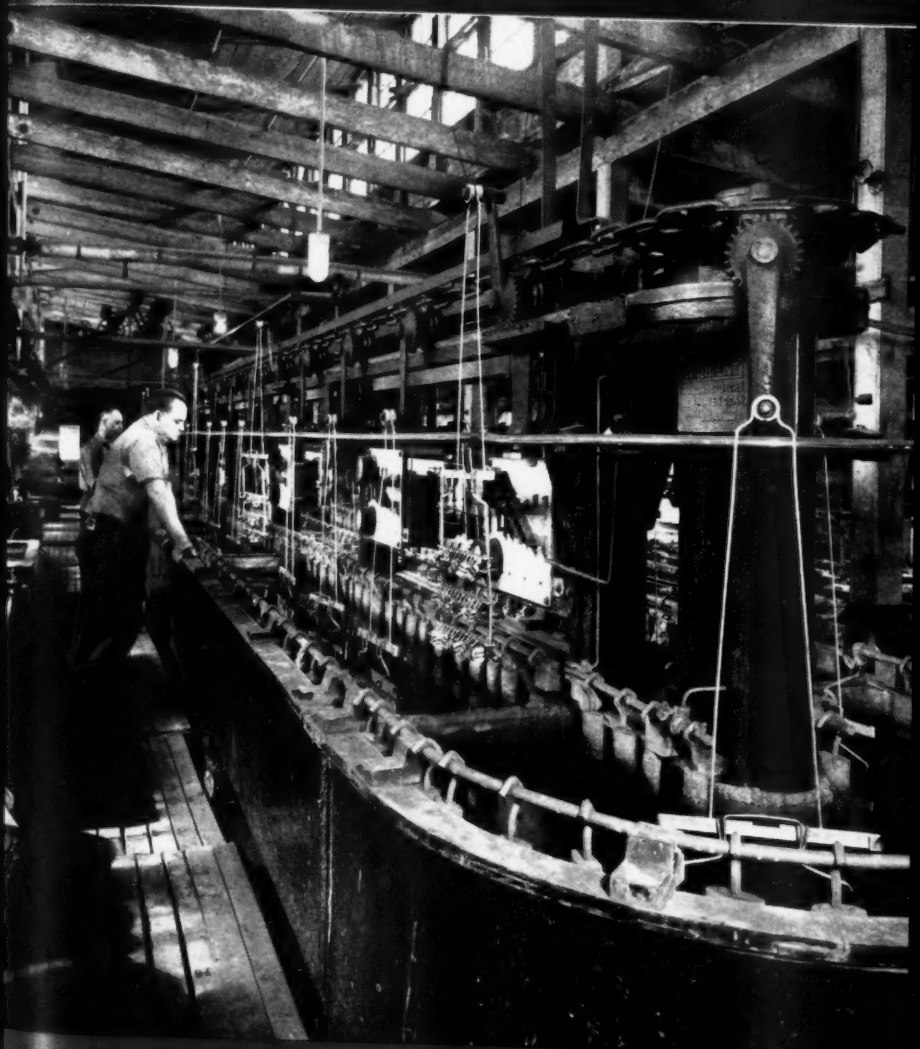
The Monthly Review

AMERICAN ELECTROPLATERS' SOCIETY



A SOCIETY FOR THE ADVANCEMENT OF THE SCIENCE OF ELECTROPLATING

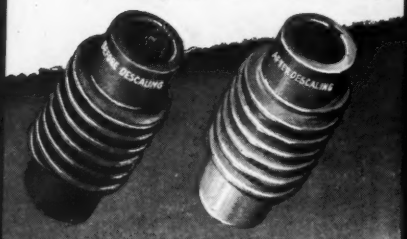
APRIL — 1942

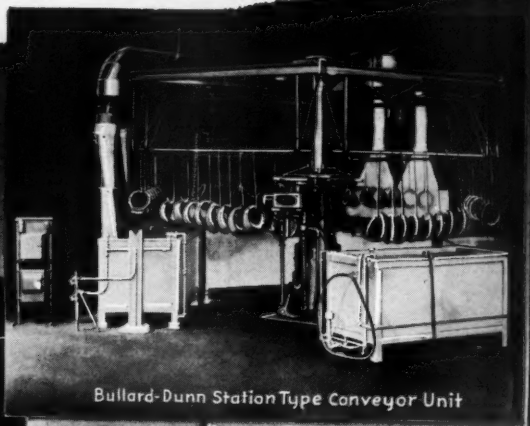
CLEPO CLEANING EFFICIENCY

TEAMS WITH

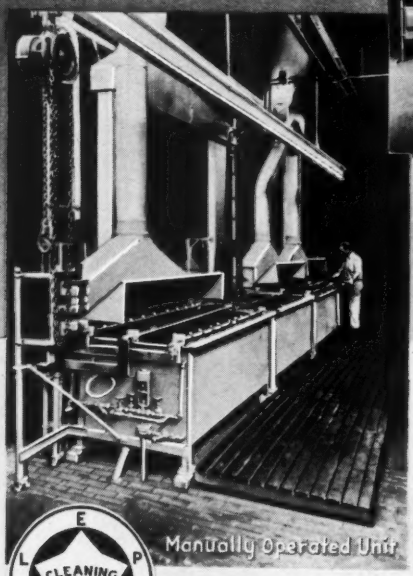
BULLARD-DUNN PROCESS

FOR REMOVAL OF SCALE, OXIDE, CARBON AND GREASE

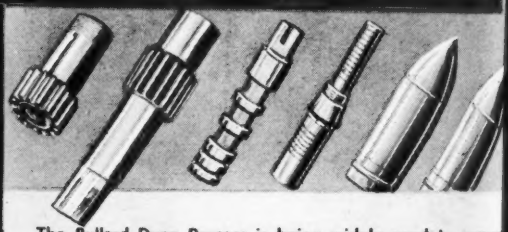




Bullard-Dunn Station Type Conveyor Unit



Manually Operated Unit



The Bullard-Dunn Process is being widely used to remove scale, oxide, carbon and grease in the manufacture of military equipment including the following: *AVIATION ENGINES, AIRCRAFT BEARINGS, MACHINE GUNS, GUN MOUNTS, PROPELLER HUBS, SHELLS, TANK TRANSMISSIONS* and *PRECISION CONTROL MECHANISMS*. There are good reasons for this. Bullard-Dunn does not change dimensions and it cleans to perfection, even recesses. We can furnish the equipment, – manual or automatic – and the supplies needed. Write us for full information.

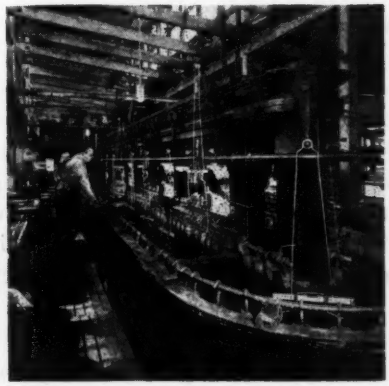
CLEPO CLEANING COMPOUNDS

FREDERICK GUMM CHEMICAL COMPANY, Inc.

538-542 Forest St., Kearny, N. J.

The Monthly Review

VOL. XXIX APRIL 1942 NO. 4



THE COVER

On the front cover is shown a full automatic plating machine used in a large manufacturing plant in New Haven Conn., where hardware is being plated continuously. In addition to the nickel plating installation this company has full automatics plating brass, bronze and copper.

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Research and the A.E.S.

The research program of the A.E.S. has been going on with few interruptions for 15 years and the various associates working in conjunction with the A.E.S. Research Committee and Dr. Blum at the Bureau of Standards have studied problems directly concerned with the plating and finishing industry. Many of the members of the A.E.S. have felt that the research was of no use to them in their daily problems or have felt that the research program has been conducted by a small group of men and they had no way of keeping in close contact with the progress of the work.

First of all let us consider what research signifies. Any research should examine the fundamental facts of the subject being studied and these facts should be studied obviously by a small group of men in order to direct the efforts of the associates along the proper channels. The selection of a research program is a problem for a large group to study and discuss but the actual conduct of the research can only be handled by a small group of men. This method of conducting the research is not peculiar to the A.E.S. associates but is the standard method of conducting research among any group of men. The A.E.S. has selected research problems which have a wide interest and due to the careful work, the results of these researches have been accepted by the world at large as being the best reports available on those subjects. Although some member of the A.E.S. may not use a particular research result to solve his next morning's difficulty, the fact that our work is recognized as being of the highest caliber lends prestige to the A.E.S. and thereby increases the prestige of its individual members. As an example of this, the largest Standards Association in the world, the American Society for Testing Materials, looks to the A.E.S. for data on plating standards. This illustrates the prestige of our research work. In most cases the A.S.T.M. solicits funds and conducts researches among its own members to accumulate

the necessary data. The standards based on our work have been recognized throughout the world and thus have been a help to the A.E.S. and its members.

We can all recall several years ago when Stainless Steel first became available that the great cry was "Stainless Steel will put plating out of business." Actually the reverse has occurred in that plating has proven to be a satisfactory coating and has eliminated Stainless Steel in many places. If it had not been for the A.E.S. research on the corrosion resistance of plated coatings and the standards which have followed, plating might have been eliminated.

As to keeping in contact with the progress of the work, the members of the Research Committee and Dr. Blum are always open to suggestion and are always willing to discuss the ideas that any member may put forth on the conduct of the research. If you have any definite ideas on the matter, do not hesitate to write to any of these men and you can expect an intelligent study of your suggestions with a view of adopting them if it is advisable.

To date more than 95% of the funds to conduct the research program have been solicited and collected from the plating supply houses and from the companies who do large amounts of plating. Very little money has been received from members of the A.E.S. or from the branches themselves. This, in spite of the fact that the A.E.S. is sponsoring the research program and taking a large part of the credit for it.

We would like to see the members take a more active part in the research, both in supporting it financially and expressing interest in their activities. The present program studying the effect of polishing on the corrosion resistance of electrodeposited coatings is not only showing the results of various finishes on the quality of coatings but it is also demonstrating some very interesting facts on polishing itself. Preliminary results indicate that some of the old ideas of polishing are wrong and that we will be able to simplify polishing operations and still obtain the same type of finish. Such a research should be of interest to every member of the Society and should justify the support of the members.

Indium Plating

Read before Newark Branch Meeting
February 6, 1942
By URBAN A. MULLIN
Wright Aeronautical Co.. Paterson, N. J.
Member of Newark Branch

THERE have been few developments in the application or use of Indium since the publication of the article on "Electrodeposition in the Aircraft Industry" in the Monthly Review, March, 1941. Therefore, that paper will be used as the basis of the present discussion.

Indium is found in Nature, associated with zinc, lead, iron, copper, silver, and gold. The name is derived from the blue line which it imparts to the spectrum. The valence is usually 3; atomic weight 114.8; melting point 311 deg. F., specific gravity 7.3, softer than lead and very ductile. Current price is $12.50 per Troy ounce for the pure metal and $7.00 per Troy ounce for Indium Chloride, equal to $13.50 per Troy ounce of contained metal, since Indium Chloride contains 51.87% Indium.

Probably the principal use of Indium today is as an alloy of various non-ferrous metals to impart surface hardness, fatigue resistance and corrosion resistance. Its hardening affect makes it valuable for stiffening gold and silver articles, in addition to the non-tarnishing affect on silver and other metals. The anti-corrosive property makes it useful in automobile and air-craft engines. Practically all of the bearing metals used in these engines are corroded by organic acids blended into motor oils, or by decomposition products formed in the crankcase. A small percentage of Indium diffused into these materials effects a remarkable decrease in corrosion. The optimum amount is an open question and varies with the constituents of the bearing metal; the range is probably 0.2% to 4.%.

The usual method for producing this alloy is to electro-deposit the required amount on the article to be protected and then diffuse it by a suitable heat treatment. Indium melts at 311 deg. F. and diffuses readily into lead, copper, cadmium, zinc, tin, silver and gold. It does not diffuse readily into iron, nickel or cobalt. The treatment generally recommended is to immerse in an oil bath at 340 deg. F. for two hours. If this degree of heat

can not be used, a longer period at a lower temperature will be necessary.

There are two types of plating baths used — the cyanide and the sulfate. In general it is the opinion of the speaker that the cyanide bath is more difficult and more expensive to prepare, but easier to use, while the sulfate bath is less complicated and less expensive to prepare, but requires closer operating control. The cyanide bath contains 8 Troy ounces per gallon of Indium Chloride at $7.00 per Troy ounce, or $56.00 per gallon of plating solution, in addition to dextrose and sodium cyanide. The sulfate bath contains 2½ Troy ounces per gallon of metallic Indium at $12.50 per ounce, or $31.25 per gallon of plating solution, in addition to the sodium sulfate and sulfuric acid.

The Cyanide Bath

Since the cyanide bath uses insoluble anodes, — platinum or carbon — it is necessary to replenish the bath by adding Indium Cyanide concentrate, prepared as follows:

Dissolve 62.2 grams of anhydrous dextrose sugar (Merck C. P.) in 300 to 400 cc. distilled water at room temperature.

Dissolve 373 grams of sodium cyanide in about 1 liter of distilled water at room temperature. Add the dextrose solution to the cyanide solution. The resultant solution is called the cyanide dextrose solution.

Dilute one 8 oz. bottle of Indium Chloride to about 400 cc. with distilled water. If the Indium Chloride is cloudy at any time, add as little concentrated hydrochloric acid as is necessary to clear up the cloudiness. In the hood, add the Indium Chloride solution very slowly, with vigorous agitation to the cyanide-dextrose solution. The white precipitate which is formed upon the immediate addition of small quantities of the Indium Solution should be dissolved before further additions of the metal are made. Allow this mixture to cool slightly, cover the container and place in a refrigerator at about 5 deg. C. for 72 hours.

Filter through a Buchner funnel with suction through Whatman No. 54 filter paper. Wash the bottle and precipitate well, and then dilute the solution to 2 liters.

Analyze the solution. The Indium metal content should be 7.83 Troy oz. per gal. The free sodium cyanide content should check about 10 Troy oz. per gal. If the cyanide content is low, add a sufficient quantity of sodium cyanide to bring it up to

the desired value. If this concentrate is to be used to make a new plating bath, add it to an equal volume of water and again adjust the free cyanide to 10 oz. per gal.

Methods for Analysis

Indium Metal: Pipette 5 cc. of solution into a 250 cc. beaker. Add 10 cc. conc. HNO_3 (Hood.). Boil for a few minutes. Remove from hot plate, add 1 g. of ammonium nitrate, and 50-75 cc. water.

Allow the solution to cool, add ammonium hydroxide slowly, until the precipitate which has formed begins to redissolve. Boil off the excess ammonium hydroxide, add a small quantity of paper pulp and filter while hot, washing the precipitate with 1% ammonium nitrate. Check the filtrate by boiling to see if all the Indium has precipitated out. Place the precipitate and paper in a weighed porcelain crucible. Dry and ignite and reweigh.

Wt. of Ppt. x 20.1 equals Troy oz. per gal. of Indium metal.

Free Sodium Cyanide: Pipette a 5 cc. sample of the filtered solution into a 150 cc. Erlenmeyer flask. Dilute to about 80 cc. with water. Add 1 cc. of 10% potassium iodide and titrate with 0.1 N silver nitrate to faint turbidity.

$$\text{cc of Silver Nitrate} \times \frac{\text{Normality}}{0.1} \times 0.238 \text{ equals Troy oz. per gal. of Sodium Cyanide.}$$

Indium is plated from the cyanide bath at 15 amps./sq. ft. at room temperature. There are no precautions other than those observed with any cyanide plating bath. The amount of Indium deposited bears a weight ratio to the metal it is intended to protect. The plate is too thin to be measured, so the proper time and current is determined by weighing the same or a similar pilot part before and after plating for an estimated time. From this figure, and using the same current density, the proper time can be calculated.

It is advisable to run at least one such test at the beginning of each shift on a known pilot part, as check on the solution. The metal content should be held at 3 to 4 Troy ounces per gal. and the free cyanide at 10 to 12 Troy ounces per gal. by suitable additions of concentrate and cyanide. Since the additions increase the volume correction should be according to formula.

Assume that the concentrate has 8 oz. per gal. of metal, and that we have 5 gals. of used solution, containing 3 oz. per gal. which we wish to bring up to 4 oz. per gal. Then 3 oz. per gal. x 5 gals. plus 8 oz. per gal. x X equals 4 oz. per gal. x 5 gals. plus 4 oz. per gal. x X. Or (3 x 5) plus 8X equals (4 x 5) plus 4X.

4X equals 5

X equals 1¼ gals. concentrate to be added.

The Sulfate Bath

The Indium sulfate bath is prepared by dissolving the metal in slightly less than the required amount of sulfuric acid, and adding sodium sulfate. Solution is very slow, so usually the metal and acid are heated several hours with a reflux condenser. Metal foil is generally used to help solution. For example, weight 21 grams of metal foil cut in small pieces, into a boiling flask containing 15.3 cc. of 95% sulfuric acid diluted to 300 cc. with distilled water. Reflux over night. Filter and add 10 gr. of anhydrous sodium sulfate or its equivalent of the hydrated sulfate. Dilute to 1 liter. Adjust pH to 2.0, according to the following table. pH 2.8 — add 16.0 cc./liter normal sulfuric acid.

2.7	16.0
2.6	15.0
2.5	13.9
2.4	12.0
2.3	10.00
2.2	7.4
2.1	4.1
2.0	0

Plating is done at room temperature. The current density depends on the pH and on the basis metal being plated — possibly because Indium is usually not plated heavy enough to overcome the influence of the basis metal. Accurate control of the pH is essential when using the sulfate baths.

Anode efficiency is 100%, compared to a cathode efficiency of about 50%. Therefore, the metal content must be controlled by the use of inert anodes, as required. The increase in metal content will be indicated by an increasing pH, at which time inert anodes should be used until the pH drops to normal. Diffusing treatment is the same for the sulfate deposit as for the cyanide deposit.

Metal content may be determined by placing 10 cc. of sample

in a 250 cc. beaker. Dilute to 35 cc. with water. Add an excess of ammonium hydroxide and 1 gram of ammonium nitrate crystals. Boil, add paper pulp and filter through No. 40 Whatman, washing well with hot dilute ammonium nitrate solution. Ignite with as little flame as possible and weigh as IN_2O_3.

IN_2O_3 x 82.7 equals grams/liter Indium

The voltage drop across the solution should be determined with a new solution and under standard conditions as to anode — cathode distance and current density desired. A conductivity test on a used solution will then indicate whether an addition of sodium sulfate is required. The amount can be determined by trial.

All Indium plated work should be rinsed after plating with a small amount of distilled water. The metal can then be recovered by precipitating with ammonium hydroxide.

Additional information on the cyanide process may be obtained from The Indium Corp. of America, 805 Watson Place, Utica, N. Y., and information on the sulfate process may be obtained from the American Smelting & Refining Co., Barber, N. J.

Barrel Cadmium Plating

JOHN KOTCHES
Newark Branch

IN my paper on Barrel Cadmium Plating, with which many are familiar, I shall give you changes made from my paper read five years ago.

All products cadmium plated are 100% for defense and meet all Government specifications. Various labor saving operations have been incorporated into the production plating line, and I shall start from the product as it comes from the machine or other departments for finishing.

A 20 ft. cylindrical unit or barrel is used for the preparation of the article for plating, and its revolution is 2 R.P.M.

The worker dumps 4 tote boxes of 80 lbs. each or 320 lbs. into a concrete type bucket, and is raised by an electric hoist to an elevation for *chuting* the work into the first operation. This

hoist is equipped with a limit stop switch so that the operator does not damage the hoist.

The work slides into the Barrel Unit and is carried through two Commercial Cleaners. The first compartment is a concentrated solution of 8 oz. per gal., and removes almost all the water soluble lubricants that are used in machining. The work is moved along this 20 ft. Barrel by means of what is known as flights, which is equal to a worm construction. These flights are riveted to the inside of the Barrel. There are a series of compartments in this 20 ft. unit, and as the work leaves the compartment it is picked up by a specially built pick up to transfer the work into the next compartment.

After the work has moved from the first cleaning cycle, it is then passed on to the second alkaline cleaner of one-half the concentration of the first one. This is done to insure a thorough cleaning.

From here it passes on to the water rinse and then moves into the Acid Pickling Compartment.

This compartment contains a 15% Hydrochloric Acid Solution with a well known addition or wetting agent. The work passes on into the water rinse and is then moved into the cyanide rinse compartment for a final preparation of plating.

I want to state that this unit is exhausted by a similar method as the chromium plating solutions are exhausted, and no vapors or fumes appear at any time.

Suction is strong enough so that a newspaper sheet will be drawn into the duct. As the work leaves the cyanide rinse it then falls into a special bucket that is equal to the four tote boxes. This is a stationary bucket, which is pivoted and is dumped into the plating barrel which is placed underneath the bucket.

The time of 20 minutes has elapsed from start to finish in this unit and operators have so timed the feeding of the work that there is no waiting.

The Plating Barrel is picked up by an electric hoist and is moved on a tram rail to the plating tank.

The Plating Barrels are 42" x 14" are are placed into the 16 ft. multiple unit plating tank.

Numerous articles are passing continuously through the production line, and all articles have been pre-determined for

the plating time with a known concentration of the electrolyte.

The time of plating is controlled by a battery of time clocks which are numbered for each barrel and are set by the operator to the proper plating time. The proper plating time is given to the operator just prior to the Barrel leaving the cyanide rinse, by the analyst who has a card record for the particular part. The timing devices are equipped with two lights, and as the operator sets the plating time, a green lamp is lighted, when the proper time has elapsed a red lamp is lighted.

The operator lifts the barrel from the tank and takes six samples from various parts of the barrel and gives the articles to the analyst for the test of proper thickness. This test is the Hull Strausser Drop Test, and invariably the work meets the minimum specifications.

The Barrel is now moved on the tram rail to a pocket above the elevation of the tanks, and is dumped into this pocket. Means have been provided to catch all cadmium solution trapped in the work at this point, and as much as 10 gals. of solution are saved daily. With the high cost of cadmium, you can realize that there is a considerable saving to the department.

When the work is dumped into the pocket, it slides into a 10 ft. rinsing barrel, built on the same principle as the cleaning unit. There are four compartments to this unit, and the first rinse compartment is the only compartment with an overflow. Continuous flow of water is maintained in all compartments and is accomplished by the following economical means. The fourth or final Hot Water Compartment has all return water condensate from the various thermostatic controlled tanks. This compartment is also heated by a coil. The third compartment has a slight drip of water flowing to insure proper flow of water.

The water from the fourth compartment flows over to the third compartment and the water is slightly cooled; it then flows into the second compartment, and then into the first compartment which is where the plated articles receive their first rinse. This unit is known as cascade rinsing. This method insures fresh rinsing water continuously, and as the work moves along the unit it is gradually heated for drying.

The work is now passed along into another Barrel unit which is constructed of mesh wire.

This unit is completely enclosed and insulated. It has a

standard Fan Type unit heater built into it, and near the end of the Barrel are placed infra-red drying lamps.

The work has been pre-heated by the hot water rinse and in moving along, the tumbling of the work naturally throws out any water that may be on the work, and it is further dried by the steam unit heater. The infra-red lamps insure positive drying of work without staining. The heat from the drying unit is expelled into the department for heating when needed, or diverted to the outside.

The work drops into clean tote boxes, is placed on a conveyor, and carried on to the assembly department.

The operation of the above plating line is operated by two men who are trained to know each ones particular move.

Considerable bearing wear was experienced years ago of the special units, and the engineers have placed skid bearings made of Ligma Vitae. These bearings are greased and no sign of wear to any noticeable extent has appeared on them in the last five years.

Current for the multiple unit plating tank is furnished by a battery of rectifiers.

The rectifiers replaced the generator sets for the following reasons:

To increase production by increasing the amperage out put.

No loss of time encountered for periodic maintenance of generator, which was formerly accomplished by shutting down.

Desire to increase production without building more units of the types mentioned in this paper.

Desire to operate the units on a 7 day week, 24 hr. basis without interruption.

Desire to maintain the proper electrical pressure at all times.

Desire to deposit faster.

The complete finishing equipment is built 20 inches from the floor and steel grating is used in its entire length.

With the use of increased amperage and the operation of the plating units on a 24 hour basis, it became necessary to cool the Electrolyte.

This was accomplished in the following manner:

As the solution is continuously filtered, a heat exchanger was

placed into the filter line, and the plant has sufficient source of well water with a temperature of 48°F, which keeps the plating solution in the range of temperature between 80°F to 90°F.

In conclusion, may I say that the plating solution is a standard bath with a wetting agent, and is analyzed for the proper concentration at the beginning of each shift.

UNITED STATES NAVY "E" AWARDED FOR NORTON ACHIEVEMENT

What This Award Means

Symbol of efficiency, excellence and achievement, the Navy "E" is the highest service award the Navy bestows. An "E" painted on the funnel, turret or conning tower of a Navy ship designates distinguished gunnery, engineering or other outstanding performance. Crews which win the "E" for engineering paint the letter on the funnel, for gunnery they paint it on the mast or bridge. Turret crews who win the letter paint it on their turret.

The idea of honoring manufacturers and workers for conspicuous, cooperative and effective production of material for the Navy was promulgated by Rear Admiral W. H. P. Blandy, Chief of the Bureau of Ordnance, endorsed by Secretary Knox and approved by President Roosevelt. It is a recognition of independent effort by industry, of ingenuity and solving difficult ordnance production programs. In approving Admiral Blandy's suggestion Secretary Knox said, "We are going to ask miracles in production. We will get miracles, if I know the men and women of America who compose industry."

As authorized by the President of the United States and directed by the Secretary of the Navy, those manufacturing companies who qualify are permitted to fly the Navy "E" Pennant over their plants, and all employees of such plants are awarded an emblem in the form of a lapel button bearing the Navy insignia.

We are proud that we have the privilege of flying this symbol over the Norton plant and all Norton employees should be proud that they can wear the Navy "E" lapel button. Norton Company will supply these buttons to every employee who wishes one as soon as they can be obtained from the manufacturer, which will be early in April.

Useful Applications of Bipolarity in Practical Plating

By FRANK K. SAVAGE
Conn Instrument Co.
Read at Chicago Branch meeting
Dec. 1941

I WISH to discuss what has become a useful tool in electroplating and has solved some plating problems which would otherwise be impractical, impossible or decidedly uneconomical.

The bipolar electrode as used in electroplating is, as the name implies, positive on the end nearest the cathode and negative on the end nearest the anode. It has no direct electrical connection to either the anode or the cathode. It is obvious that whenever any conductor is in a field of an electroplating bath between the anode and the cathode, a portion of the electrical current will follow it, the path of least resistance, in preference to traveling through the solution which is of greater resistance. The end nearest the anode will be plated upon and the end nearest the cathode will be corroded. If the positive or anodic end of the bipolar electrode is of the same metal as that being plated, no solution contamination will result. The negative or cathodic end may be of any convenient metal. In some cases a metal which is insoluble as an anode in the solution may be advantageously used as bipolar material. Lead in chromium solutions, or steel in cyanide copper or silver solutions, are good examples of this. The portion of the work surface nearest the bipolar electrode will become plated to a greater thickness than otherwise would result due to the fact that the bipolar electrode has afforded an easier passage for the electrical current to that point. This is illustrated in Fig. #1. In Sketch (a) a simple flat anode and cathode are shown with a bipolar electrode in place. Current lines are roughly sketched in, disregarding all effects except solution resistance. It may be seen that the most current is directed toward the center of the cathode. Sketch (b) gives a conception of the distribution of the cathode deposit which might be obtained. Sketch (c) gives an idea of the distribution which might be obtained without the bipolar electrode.

The author is sure that all platers in this gathering have at one time or another witnessed some of the bad effects of bi-

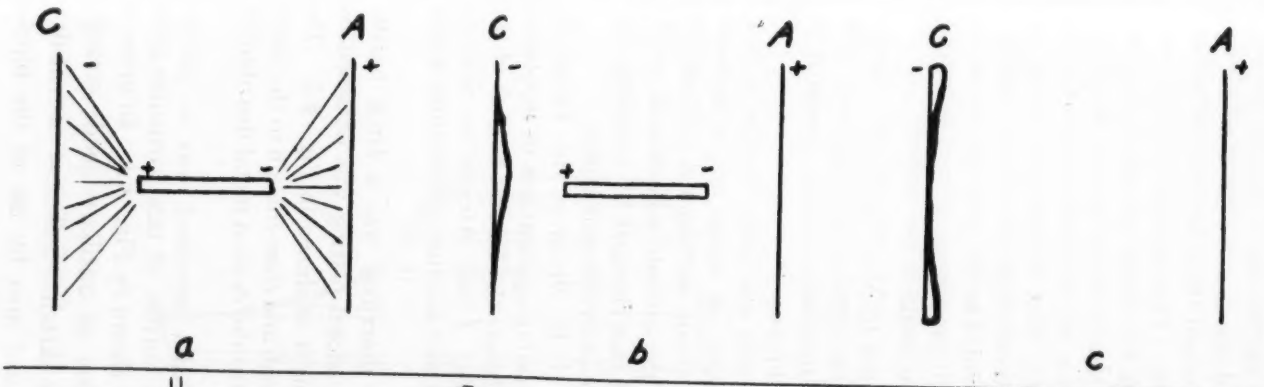
polarity. One of the common troubles occurs in uninsulated steel tanks which may be used in the case of silver, zinc, cadmium, or cyanide copper plating. If the total distance from the anodes to the tank plus the distance from any point on the work surface to the tank is less than the distance through the solution from anode to cathode, metal will be deposited on the tank, back of the anodes, and the portions of the tank nearest the work will act as insoluble anodes. The tank itself in this case is bipolar and unless the condition is corrected it will in time greatly deplete the solution in metal, deposit a heavy layer of perhaps a valuable metal on the tank and in extreme cases will burn or otherwise cause undesirable work. The life of the tank itself may also be shortened.

Perhaps the earliest practical application of bipolarity in electroplating was the use of the principle in the series refining of copper. In about the year 1892 Hayden developed the series refining process in Bridgeport, Conn., which is the earliest application of the bipolar phenomenon in plating which the author is able to find. The series refining process for copper, which was further developed later, is still used as follows:

Smooth anodes of uniform thickness are cast, and about five of these are suspended in a row from an iron hanger bar. These rows are accurately spaced in tanks much deeper and wider and somewhat larger than other copper refining tanks. At a given period the spacing may be such that about 100 to 125 rows are placed in a tank. Current is introduced at one end of the tank and travels from row to row through the electrolyte dissolving copper from one side of the next row. In other words, each tank is really from 100 to 125 depositing "cells" or electrolytic units. Starting sheets, as used in the multiple system, are eliminated, spacing can therefore be much closer.

There are at least 2 copper refineries at the present time which still use this system of refining. Its general use is prohibited by other drawbacks which make it more advisable to use the multiple system.

In 1931 a patent ([1]) was taken out by Ernest Wurth of Goppingen, Germany, wherein the use of bipolarity was described to obtain by electrodeposition, metal layers of uniform thickness on the inside of hollow shapes such as the inside of long bars of channel or other "U" or "C" shaped sections, the interior


C
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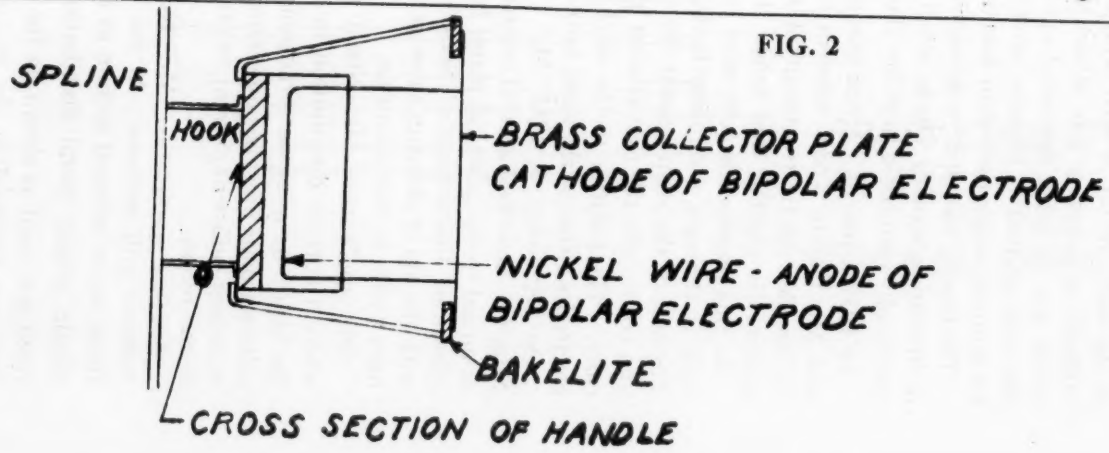
A
a
b
c

FIG. 2


SPLINE
HOOK
BRASS COLLECTOR PLATE
CATHODE OF BIPOLAR ELECTRODE
NICKEL WIRE - ANODE OF
BIPOLAR ELECTRODE
BAKELITE
CROSS SECTION OF HANDLE

of which is accessible through a narrow slot. In this process Mr. Wurth used a long thin bar of metal, one edge of which extended into the interior of the slot and the other edge of which extended out parallel to the anodes. This bipolar electrode was of the same metal as that which was being plated and as the cathodic or negative side of the bipolar strip became heavy in metal, due to being deposited upon, he reversed the position in the tank so that it became anodic, thus he was able to use it for a much longer time than would otherwise have been possible.

The bipolar electrode was suspended in the long slot by means of insulating spacing blocks which prevented it from becoming electrically connected to either the anode or the cathode.

In 1939 a patent ([2]) was granted to Mr. Charles W. Yerger and Mr. Guerin Todd, wherein the bipolar principle was used for an electrolytic treatment of strip steel, which consisted of electrolytic pickling and bright dipping.

In this process the strip steel itself was made bipolar by running it through a solution between an anode and a cathode. The side of the strip nearest the anode was cleaned cathodically and conversely the side nearest the cathode was cleaned anodically. The polarity of the steel was changed by reversing the electrodes either in the same tank or in different tanks.

On September 5, 1941, Mr. C. F. Nixon of the Turnstedt Mfg. Co. described several interesting applications of bipolarity as an aid to the practical plater before the Detroit Branch of the American Electroplaters' Society. I will attempt to describe with the aid of sketches these as well as other applications which have come to my attention.

One application Mr. Nixon described was a latch handle wherein current distribution in nickel plating was obtained on the inside by using an arrangement as shown in Fig. #2. The collector plate must be large enough and close enough to the anode to collect sufficient current to give the desired metal distribution in the recess.

Another application Mr. Nixon described was in plating radiator grill sections. At the bottom of this particular grille there was a recessed section as shown in Fig. #3. In order to obtain proper metal distribution an auxiliary anode arrangement was used as shown on the sketch. Sufficient current density was obtained in the recessed area by use of the bipolar

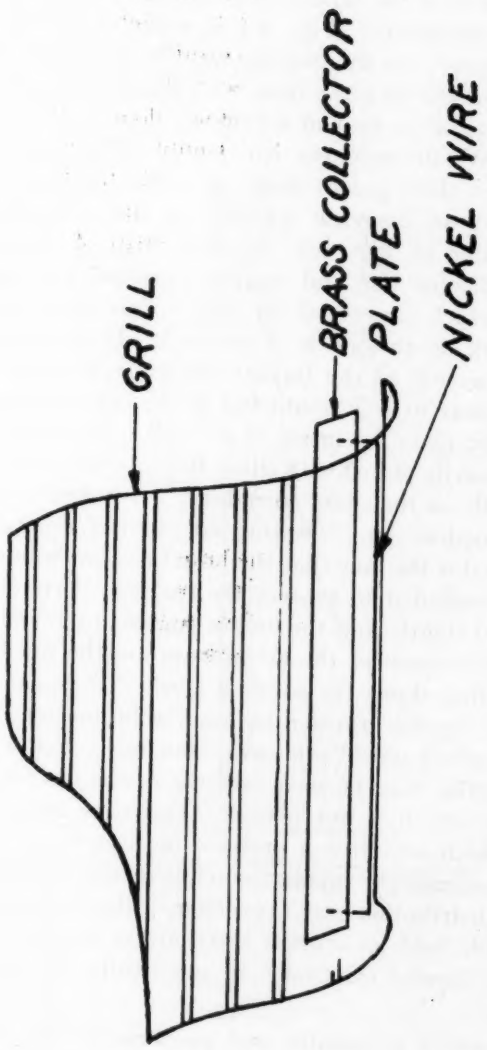


FIG. 3

electrode, to obtain the desired minimum plate thickness and to produce a bright plate.

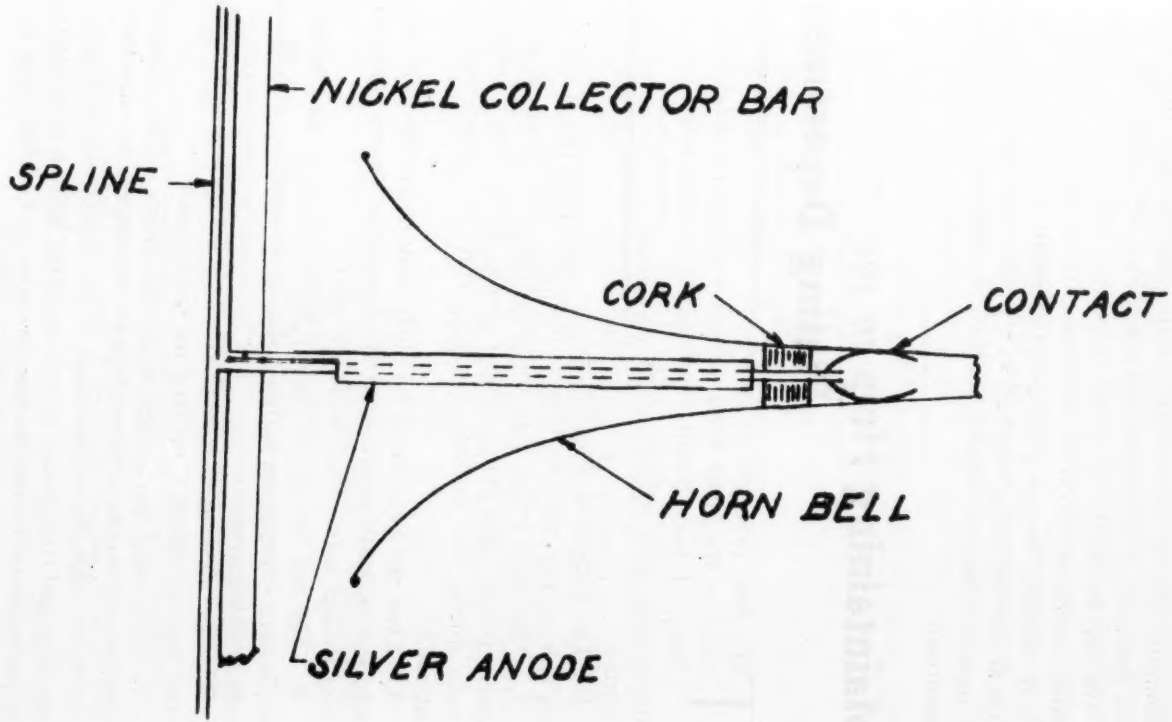
We have used the bipolar principle for some time in band instrument processing. Fig. #4 is a sketch of the bell section of a trombone. At the time we went to automatic silver plating it was impossible to place these very deeply recessed bell sections facing an anode as we had previously done in the hand operated process. We immediately had trouble throwing into the bells which were often a foot deep. A collector bar of pure nickel was placed on the rack parallel to, and insulated from, the hollow spline of the rack. A thin strip of silver was bolted to the collector bar and wrapped around the insulated rack member which supported the bell. This silver strip extended to the cork on the inside of the bell. In operation the nickel cathodic section of the bipolar electrode was plated upon and sufficient current was conducted to the silver anodic member to successfully plate the inside of the bell. When the nickel strips become heavily plated with silver they are removed and stripped. Periodically as the silver corrodes it is renewed from thin pieces of used anodes. An interesting side light of this particular plating method is the fact that the horn bells are hollow and solution must be excluded to protect the inside. Ports and tone holes are corked tightly and the hollow supporting member and spline of the rack equalizes the air pressure on the inside of the horn by extending above the solution level. No vacuum or pressure can form during transfer between solutions of different temperature which would otherwise blow out corks or draw in solution. It also may be seen that the contact is beyond the cork at a spot which is not plated. This does away with contact marks which are often a problem on high class merchandise.

We have used the bipolar principle in several other cases where current distribution was a problem. Band instruments lend a remarkable field for current distribution studies It is possible to apply bipolar electrodes to practically all ordinary plating processes.

Wherever it is possible and practical to use an auxiliary or inside anode electrically connected to the positive side of the current supply, superior results may be obtained. However, in many cases the bipolar electrode may be utilized with less cost and less time consumed. This is especially true in semi or full

FIG. 4

FIG. 4


NICKEL COLLECTOR BAR
SPLINE
CORK
CONTACT
HORN BELL
SILVER ANODE

automatic plating where extra anode rails, contact fingers and rack contacts are expensive and sometimes very awkward.

The bipolar electrode is one more tool that may be used to obtain minimum thickness requirements in recesses without so much wasteful heavy plating on exposed sections. In these days of extreme metal shortage every tool at our disposal should be used to conserve metal from both an economic and patriotic standpoint.

Maintaining Help *in the* Plating Department

GEORGE KLINK
March 6, 1942
Newark Branch

THE first principle to consider is the right kind of help. I have found that this is the most difficult task because:

1. The personnel director is not able to ascertain the type of man suited for this work.

2. The white collar man will not accept the physical annoyances: fumes, acid burns, and cyanide sores, which naturally result during the working hours in spite of innumerable precautions.

3. Even the type fitted for such work enters the field with a negative attitude as soon as the fumes are thrust upon him, even though exhaust methods are used.

4. The last two types usually leave the plant as a result of unpleasant experiences within a day or so resulting in a changeable working group.

We have developed a method which we believe is successful after having placed it on trial for three years:

1. The onset experience is at the driers. This experience lasts for two weeks or thereabouts. We do this to acquaint the employee with the surroundings of the immediate platingroom's function and equipment, as well as giving him an opportunity to acquaint himself with the men in order to find his place within the social group.

2. The next step is the tank-conveyor, which is the first opportunity for an increase in salary, where we teach them how to

keep the conveyor loaded. The employee knows that if he succeeds he will receive a bonus which varies from one to fifteen per cent. Our next move is to choose the best from this bonus group and we put them to work at the washing tank which is the most important procedure in plating. The cream of the crop which has developed this skill has an opportunity to be a leader within the plant as foreman or assistant foreman. The salary increases proportionately with the position.

3. The equipment of the plating room must be up to date. One should remember the following points:

a. cleanliness of room and employee
b. good exhaust over all acid dips
c. suction fans in windows
d. racks on the floors
e. good drainage for speedy flow of water
f. an understanding supervisor

We believe that a realization of good working conditions, both social and physical, can be maintained if the employer develops a friendly, conscientious, and complacent attitude with his employees. William Anfuso is one of my examples of this working plan, even though he has been under my supervision for several years. He started as a drier and is now my most responsible and dependable foreman.

An amendment sponsored by the Baltimore-Washington Branch proposes the following changes in the Constitution of American Electroplaters' Society:

CONSTITUTION
PREAMBLE
NAME, OBJECT AND DIVISIONS.

This Society shall be known as "The American Electroplaters' & Metal Finishers Society Incorporated" as incorporated under the laws of the State of New Jersey.

The objects of this society shall be the improvement and dissemination of the art and science of the electrodeposition and all allied *finishing* arts; the development of a co-operative spirit of friendship and mutual assistance among its members, and the increase of knowledge of those occupied in the numerous applications of electroplating *and finishing of metals.*

There shall be a "Supreme Society" which shall consist of members duly elected according to the Constitution and By-Laws, and "Branches" of the American Electroplaters' & *Metal Finishers'* Society duly organized and affiliated under the provisions and in accordance with the laws of the Supreme Society. In the Constitution and By-Laws the word "Society" refers to the Supreme Society and the word "Branch" refers to a Local Society.

PART I. THE SUPREME SOCIETY,.

ARTICLE I. FUNCTIONS.

Sect. 1. Authority: The Supreme Society shall be the governing body of the American Electroplaters' & *Metal Finishers'* Society and all Branches shall be subject to the laws enacted by this body. It shall be the final tribunal for the entire body and its decisions shall be final.

ARTICLE VI. CHARTERS.

Sect. 3.

(c) That said group pray for a Charter in writing and that each member over his signature pledge his loyal support to the American Electroplaters' & *Metal Finishers'* Society, and promise to abide by its Constitution and By-Laws.

PART II. BRANCH SOCIETIES.

ARTICLE I. NAME AND OBJECT.

Sect. 1. Name: Each Branch Society shall be known as the Branch Society of the American Electroplaters' & *Metal Finishers'* Society of the city or cities in which the Branch is located.

ARTICLE II. MEMBERSHIP.

Sect. 2. Active Members: These shall consist of foremen of Electroplating *or other Metal Finishing Departments* elected by a majority vote. Each applicant shall be required to furnish proof that he has been actively engaged in electroplating or other form *of metal finishing* for at least five years; one year of which he must have acted in the capacity of a foreman or supervisor. He may also be required to pass such examination in the deposition of metals or *other metal finishing* processes as may be deemed advisable by the Branch. A foreman or supervisor is hereby defined as an executive engaged in supervising and directing the personnel and production of a plating *or metal finishing* plant or department.

Sect. 3. Associate Members: These shall consist of any persons not qualified for active membership who are engaged in any phase of the electroplating and *metal finishing* industry and interested in the aims and welfare of this Society. Associate members shall be elected by a majority vote, and shall have all the privileges of an active member except being eligible to election to the Supreme Society.

BY-LAWS.

PART II. BRANCH SOCIETIES.

ARTICLE I. MEETINGS.

Sect. 2. Object: The meeting shall be for the presentation and discussion of papers on electroplating, *metal finishing* or similar subjects, and for the transaction of any business that may be brought before the meeting in accordance with the objects stated in the Preamble of the Constitution.

ARTICLE V. CONVENTIONS.

Sect. 1. Time and Place: The Branch Societies of the American Electroplaters' & *Metal Finishers'* Society shall meet in convention each year during June or July at a place that has been decided upon at a previous Annual Meeting of the Supreme Society. Four days shall be allowed for the Convention if the business of the Branches warrants such a period.

Sect. 2. Purpose: The Convention shall be for the purpose of (a) presenting and discussing papers, (b) exhibiting anything that relates to the electrodeposition *or finishing* of metals, and for any other purposes that the Society may desire, that are in accordance with the Constitution and By-Laws.

C. T. THOMAS, *Secy.*
Baltimore-Washington Branch, A.E.S.

The Fundamentals of Electrochemistry and Electrodeposition

IX. The Theory of pH Indicators

By SAMUEL GLASSTONE
D. Sc., Ph. D.
Professor of Chemistry
The University of Oklahoma,
Norman, Oklahoma.

Definition of a pH Indicator

A pH indicator is a substance which changes its color with the pH of the solution into which it is placed. It is seen, therefore, that in principle such a substance might be used for the determination of pH values, since each color depth or color tint should correspond to a definite pH of the environment. In practice it is found that for every indicator there is a certain range of pH over which it can be employed, but this range varies from one indicator to another. In order to understand these facts and to be in a position to make use of indicators for the determination of pH values, it is desirable to know something of the theoretical principles of the subject. The complete theory of indicators is fairly complex, but the main conclusions can be stated in a relatively simple form.

The Indicator Exponent

The majority of pH indicators are acids; a few are bases in their familiar forms, but for certain reasons, which cannot be discussed here, they may also be regarded as acids. Like any other acid, an indicator acid, represented by the symbol HIn, will ionize in water or in any aqueous solution, as explained in previous articles, according to the equation:

$$HIn + H_2O \leftrightharpoons H_3O^+ + In^-, \qquad (1)$$

where H_3O^+ represents the hydrogen ion in aqueous solution, and In^- is the anion of the indicator. By applying the law of mass action to this equilibrium, it can be readily shown that

$$[H_3O^+] = k_{In}\frac{[HIn]}{[In^-]}, \qquad (2)$$

where the square brackets, as before, represent the concentrations of the various species. The factor k_{In} is a constant for

the given indicator, known as the *indicator constant.* (Readers familiar with the law of mass action should have no difficulty in deriving this expression. It should be remembered that, in accordance with convention, the concentration of the water is taken as unity). By taking logarithms of equation (2), and changing the signs throughout, it follows that

$$-\log [H_3O^+] = -\log k_{In} + \log \frac{[In^-]}{[HIn]}. \quad (3)$$

The quantity $-\log [H_3O^+]$ is the same as that which has been referred to as $-\log [H^+]$, and so it is equivalent to pH. Similarly, the term $-\log k_{In}$ is given the symbol pk_{In} and is called the *indicator exponent.* Hence, equation (3) may be written in the form

$$pH = pk_{In} + \log \frac{[In^-]}{[HIn]}, \quad (4)$$

where pk_{In} is a definite constant for each indicator, depending on various chemical and physical properties of the substance.

pH and Indicator Color

One important characteristic of a compound having indicator properties is that the great majority of the undissociated molecules, represented by HIn, have a color that is distinctly different from that of a large proportion of the anions In^-. Suppose we refer to the color of the HIn form as "color A" and that of the In^- form as "color B", then the actual color of the indicator when placed in a given solution will depend on the relative amounts of HIn and In^- that are present, and this, as is evident from equation (4), depends on the pH of the medium. If we suppose that the extent to which each constituent contributes its color to that of the whole system is proportional to its concentration, as seems very reasonable, then we may replace the concentration term [HIn] by "Amount of color A", while the concentration of the anions, i.e., $[In^-]$, may be replaced by "Amount of color B"; equation (4) then becomes

$$pH + pk_{In} + \log \frac{\text{Amount of color B}}{\text{Amount of color A}}. \quad (5)$$

Since the actual tint or depth of color exhibited by the indicator depends on the ratio of the amounts of the two colors, it is at once evident from equation (5) that the color will depend in a very definite manner on the pH of the solution and the pk_{In} of the indicator.

So far nothing has been said that would identify the colors A and B with the known colors of the indicator, but the necessary connection is not difficult to find. A consideration of the equilibrium represented by equation (1) shows that if the indicator is placed in a relatively acid solution, that is one in which the hydrogen ion concentration, $[H_3O^+]$, is high, the equilibrium will be displaced towards the left hand side. That is to say, in an acidic solution the indicator will be almost entirely in the form of HIn molecules. It is seen, therefore, that the color A, which is associated with the HIn form, is really the *acid color* of the indicator. In other words, the letter "A" may be regarded as standing for "acidic". For methyl orange, for example, color A is red, for litmus it is also red, and for phenolphthalein it is colorless. Suppose, on the other hand, the indicator is present in an alkaline solution, which tends to remove H_3O^+ ions, the equilibrium of equation (1) will be displaced to the right. The indicator will then consist almost exclusively of the anions In^-. The color B, which may be regarded as that of the In^- form, is therefore the alkaline or *basic color* of the indicator; hence, the letter "B" may be supposed to stand for "basic". The color of methyl orange in a basic, or alkaline, solution is yellow, that of litmus is blue, while that of phenolphthalein is red.

With this interpretation of the colors A and B, we may write equation (5) as

$$\mathrm{pH} = \mathrm{p}k_{\mathrm{In}} + \log \frac{\text{Amount of basic color}}{\text{Amount of acidic color}}. \qquad (6)$$

If the $\mathrm{p}k_{\mathrm{In}}$ of the indicator is known, and the proportion of acidic and basic colors exhibited in a given medium could be determined, the pH of that medium could be evaluated. For example, $\mathrm{p}k_{\mathrm{In}}$ for the indicator bromcresol green is 4.67; if when placed in a particular solution the color of the indicator is estimated to consist of one-quarter of the basic color (blue) and three-quarters of the acidic color (yellow), the pH of the solution is 4.19. This result is arrived at in the following manner: the ratio of the amount of basic color to acidic color is $\frac{1}{4}$ to $\frac{3}{4}$, i.e., 1/3, and since the logarithm of 1/3 is −0.48, it follows from equation (6) that the pH is equal to $\mathrm{p}k_{\mathrm{In}}$, i.e., 4.67, minus 0.48, which is 4.19.

The Useful Range of an Indicator

In theory, the ratio of the amounts of basic to acidic colors may have any value, but in practice it is possible to detect the proportions of the two colors within certain limits only. For example, if about 1 per cent of a blue color is added to 99 per cent of red, the eye would not be able to notice any difference from pure red. In general, it is necessary for there to be a minimum of about 10 per cent of a particular color before it can be easily detected in the presence of another color. The actual figure depends, of course, on the nature of the two colors, but for our purpose it may be supposed that a minimum of about one part in ten is generally necessary before the color can be observed by the eye. It follows, therefore, according to equation (6), that before the basic color of an indicator can be detected in the presence of the acidic form, the pH will be given by the relationship

$$\mathrm{pH} = \mathrm{p}k_{\mathrm{In}} + \log \frac{1}{10} = \mathrm{p}k_{\mathrm{In}} - 1.$$

Similarly, the acidic color will no longer be detectable in the presence of excess of the basic color when the ratio of basic to acidic color is ten to one, so that the pH is then given by

$$\mathrm{pH} = \mathrm{p}k_{\mathrm{In}} + \log \frac{10}{1} = \mathrm{p}k_{\mathrm{In}} + 1.$$

It follows from these two equations that the *useful range* of an indicator is approximately one unit of pH on each side of the $\mathrm{p}k_{\mathrm{In}}$ of that particular indicator. For example, since the $\mathrm{p}k_{\mathrm{In}}$ of bromcresol green is 4.67, this indicator can be of practical value only over the range of about pH 3.7 to about pH 5.7. At pH 3.7 the color is so close to that of the completely acidic form that further addition of acid produces no detectable change. Similarly, at pH 5.7 the color is almost identical, as far as the eye can see, with that of the completely basic form of the indicator. Since the useful range of an indicator is restricted to about two units of pH, one unit each side of the $\mathrm{p}k_{\mathrm{In}}$ value, it is obvious that a number of indicators are required to cover the range of pH from zero to 14 encountered under ordinary circumstances, i.e., from a completely acid to a completely alkaline solution.

Further consideration of the subject of pH indicators will be given in the next article of this series.

First Annual Photographic Display of The A.E.S.

30th National Convention of The American Electroplaters Society
June 8-10, 1942—Grand Rapids, Michigan

Many members and friends of the A.E.S. are interested in Photography as a hobby, and a great deal of interest has been shown in the prospects of a Photographic Exhibit at the Convention in June.

There will be awards for outstanding pictures in each division. Pictures of past conventions, familiar faces of old friends of the A.E.S., the first generator, or anything else which will help make such a display of particular interest is requested.

The Rules are Simple. The following tentative divisions are made for grouping:

1. Manufacturers Photographs of Equipment and Processes
2. Photographs of Plated Parts (emphasis on design and technique)
3. People in Activities and Occupations, Portraits.
4. Landscapes, Views, Gardens, Flowers, Buildings, Architecture
5. Hobbies, Table Top Photography (miniatures)
6. Still Life
7. Animals

Specifications:

Mounting: Pictures shall be mounted on Standard 16" x 20" White or Cream pebble grained matte finish mounting board. ALL PICTURES SHALL BE MOUNTED WITH BOARD IN THE VERTICAL POSITION.

Identification: Pictures may be titled in the lower left corner of picture on mount, name of author may appear at lower right corner of picture on mount.

Author's Name, Address, and Classification of Entry should be on reverse side of each mount.

Shipping: Entries should be in the hands of the Convention Committee not later than May 25th.

Packages of mounts should be wrapped between full sections of corrugated or fibre board to prevent damage in shipping. The Committee takes ful responsibility for the safe return of pictures submitted for Photographic Display.

Address: Chairman of Photographic Exhibit, Care of Chester W. Smith, General Chairman, 55 Mt. Vernon, N. W. Grand Rapids, Michigan.

Any number of prints may be entered in one or more classifications. Three Judges will make the selections for awards, two of which will be members of the A.E.S. Due to limited space available, the right to select entries is reserved for the judges.

CONVENTION NOTES

The branch displays of plated ware which have been featured during past conventions will not be held during the Grand Rapids Convention. It would be difficult indeed this year to attempt to assemble plated products for display. With practically all of the metals, formerly used for decorative purpose on the list of strategic materials for war purposes, very few of them will find their way on to nondefense items. The war effort requires the plating of many parts for both the Army and the Navy, but such parts are not usually put on public display and it is difficult to get permission to do so.

Therefore the 1942 convention committee decided to put on a photographic display. Such a display has many interesting features. Many platers being chemists are interested in amateur photography and this will be a chance for them to show their hobby in competition with other platers. It is expected that there will be many interesting and highly artistic photos shown in this category.

All firms engaged in the manufacture and selling of plating and polishing equipment have in their possession pictures of their machines and of installations of these machines. Pictures of this type are always of interest to those engaged in plating. This part of the photographic display can to some extent take the place of the manufacturers exhibits held at some of the past conventions and will no doubt attract a great deal of interest.

Prize ribbons will be given in the various classes according to the rules set forth below. There will be three judges selected to award the ribbons, consisting of two men prominent in the society and one Grand Rapids photographic artist, assuring fair and impartial judging.

All members and manufacturers are urged to contribute to this new and different feature.

Monday Morning, June 8.

SPECIAL DEFENSE SESSION

1. "Military Applications of Electroplating"
   by—Dr. Wm. Blum—U. S. Bureau of Standards, Washington, D.C.
2. "The Present Situation in the Electroplating Industry as regards Government Restrictions and Government Business."
   by—Wm. McCord, War Production Board, Electrical Appliance and Consumers Durable Goods Branch, 3rd. floor, Bldg. E, Washington, D.C.

Monday Afternoon, June 8.

TECHNICAL PLATING SESSION

1. "Progress Report on the Effects of Polishing on the Protective Value of Plated Coatings"
   by—Gerald A. Lux, A.E.S. Research Associate, National Bureau of Standards, Washington, D.C.
2. "Plating of Selective Carburizing"
   by—M. M. Thompson, Director of Research, National Cash Register Company, Dayton, Ohio.
3. "Diffusion of Thin Electroplated Films"
   by—Dr. Benjamin Lustman, Research Chemist, Standard Steel Spring Company, Corapolis, Pa.
4. "Interesting Electroplating Reactions shown by Colored Motion Pictures"
   by—Frank K. Savage, Research Chemical Engineer, C. G. Conn, Ltd., Elkhart, Indiana.
5. "Preparation of Surfaces for Hard Chromium Plating"
   by—Mr. Arthur W. Logozzo, General Electric Co., Plastics Department, Pittsfield, Mass.

OXIDE COATINGS & AIRCRAFT PLATING SESSION

Tuesday Morning, June 9.

1. "Surface Treatment of Magnesium"
   by—Dr. J. D. Hanowalt, Mgr. of Production Control, Dowmetal Div., Dow Chemical Co., Midland, Michigan.
2. "Preparation of Aluminum for Electroplating"
   by—W. J. Travers, Chrome Alume Co.
3. "Anodizing Aluminum by the Chromic Acid Process"
   by—L. G. Tubbs, Mutual Chemical Co.
4. "Metal Finishing for Military Aircraft"
   by—Julius Teres, Wright Field, Dayton, Ohio.

ELECTROPLATING SESSION

Tuesday Evening, June 9.

1. "Comparative Tests of Ocean Water vs. Standard Salt Spray"
   by—Dr. Carl E. Huessner, Chrysler Corp., Detroit, Michigan.
2. "Lead Sulfamate Plating"
   by—E. W. Schweikher, Electroplating Div., E. I. DuPont de Nemours & Co., Cleveland, Ohio.
3. "Bright Copper Plating from an Acid Solution"
   by—Wm. M. Phillips, Head of Electrochemical Dept., General Motors Research Corp., Div. of General Motors Corp., Detroit, Michigan.
4. "Application of Iron Deposits in the Printing Industry."
   by—Dr. Vernon A. Lamb, Bureau of Printing & Engraving, Washington, D.C.
5. "Indium Plating in Practice."
   by—Dr. Wm. S. Murray, President of Indium Corp. of America, Utica, N. Y.

ORGANIC FINISHING SESSION

Wednesday Morning, June 10

1. "Equipment for Application of Organic Finishes."
   by—Mr. E. F. Fry, DeVilbiss Company, Toledo, Ohio.
2. "Formulation, Application and Availability of Organic Finishes"
   by—Chas. A. Lankau, Chemist, Egyptian Lacquer Co., New York, N. Y.
3. "Military Applications for Organic Coatings."
   by—Paul Goodell, C. M. Hall Lamp Co., Detroit, Michigan.
4. "Application of Phosphate Rustproofing in Defense Industries."
   by—V. M. Darsey, Technical Director, Parker Rustproof Co., Detroit, Michigan.

BUSINESS & RECREATIONAL

Monday Morning, June 8.

Registration
Business Session
Welcome to Delegates, Members and Visitors by General Chairman
Address by President of Grand Rapids Branch, Maurice Caldwell
Address by President of A.E.S., Ellsworth T. Candee.

Monday Evening, June 8.

International Fellowship Club Open House.

Tuesday Noon, June 9.

Victory Luncheon—Speaker and Round Table Discussion.

Tuesday Afternoon, June 9.

Visitation of Robt. W. Irwin Furniture Factory.

Wednesday Afternoon, June 10.

Business Session
Election of Officers
Reports of Committees
Selection of 1943 Convention City
Presentation of Awards.

Wednesday Evening, June 10.

Banquet and Dance
Floor Show
Drawing.

LADIES PROGRAM

Sunday, June 7.

Registration.

Monday, June 8.

Luncheon and Style Show.

Monday Evening, June 8.

International Fellowship Club Open House.

Tuesday Morning, June 9.

Tour of Furniture Factory Show Rooms.

Tuesday Noon.

Luncheon at Womens City Club
Visitation of Furniture Museum & Art Gallery

Tuesday Evening

Convention Hostess to Ladies
Amy Loomis, Sketches, Monologues and Entertainment.

Wednesday Morning, June 10.

Tour of City and Gardens.

Wednesday Noon.

Luncheon at Knollcrest Farm.

Wednesday Evening.

Banquet and Dance
Floor Show, Drawing of Prizes.

Supplies and War Production

by W. D. STARR
The Lea Mfg. Company
Waterbury, Conn.

APRIL 1, 1942 is certainly an important date in the history of electroplating. For the duration, Copper, Nickel, Cadmium, and Tin will be used to plate only important War Production items. This leaves Zinc, Silver and Gold as the principal elements which can be used with no restriction, and Chromium which can still decorate most any article.

The demand for Zinc Anodes is especially heavy because of switching from Nickel, Tin and Cadmium on many items, but we are encouraged by reports that Zinc production will increase.

Silver is becoming very important for plating certain War items in spite of its cost and a great deal of development work to adapt it properly is being rushed to completion. This is mostly Silver direct on steel. Silver is expected to replace scarce metals in the plating of numerous civilian production items as well.

Chromium cannot be used on domestic cooking appliance parts nor on passenger car and light truck parts and accessories. Other uses are unrestricted to date. The new Chromium Order M-18-b limits the quantity of Chromic Acid which can be used by any firm to the monthly rate of consumption from July 31, 1940 to June 30, 1941. Procurement of this chemical may be influenced by the fact that production of Chromic Acid is limited to 80% of the output during the basis period.

Among recent W. P. B. actions are:

(1) WPB Order M-6-A specifying that Nickel in the form of metal, salts, or solutions from which the Nickel is recoverable may not be sold without specific authorization by the Director of Industry Operations except to Metals Reserve Co. This is preliminary to requisitioning inventories made idle by M-6-b.
(2) Amendment No. 5 to Supplemental Rubber Order M-15-B increasing the amount of rubber allowable for lining tanks sold with adequate preference ratings.
(3) Prohibition on the use of Rhodium for jewelry so as to insure a supply for coating reflectors in anti-aircraft searchlights.
(4) Requisitioning of white metal, tin, and tin bearing metal inventories from costume jewelry manufacturers.

Nothing new in girdles and foundations during March, but we are watching every development.

Here and There

THE JOINT MEETING IN INDIANAPOLIS

Dear Mr. Kennedy:

I am writing this letter to you purely out of enthusiasm and giving you an off the record bird's eye-view of our regional meeting, held jointly with the Anderson, Cincinnati and Dayton Branches.

We are happy to inform you that the meeting was more than a success. A number of people attended; including members and guests there were 191. The Indianapolis attendance was pretty close to 100%.

It might interest you that among the guests present were Dr. Frank Mathers of Indiana University; Mr. Caldwell of Grand Rapids, our executive 2nd vice-president; Charles Conley of Dayton, our executive 1st. vice-president; Bob Wagner of Guide Lamp; Mr. Vogel of Products Finishing; Mr. Helbig of Darco and the presidents of the respective Branches. There were many others from many states, as far away as Waterbury, Conn.

We had as our principal speaker, George B. Hogaboom, who, as you know, is now with the War Production Board. Mr. E. L. Luaces of Toulmin & Toulmin, Patent Attorneys, gave a very interesting and enlightening discussion on the subject of "Knowledge of patents every person should know." May I add that everybody enjoyed Mr. Luaces discussion very much. He is a very good speaker; a man of personality and knows his subject well. As our third speaker, we had Mr. Gustav Soderberg of the Udylite Company.

We have been very fortunate in soliciting for complimentary advertisements in our program and very fortunate to be ahead at the end of the meeting instead of in the hole. We have had many compliments from the other branches who were so impressed with the outcome of our young convention that they are very seriously considering holding one next year at their city.

One thing we have accomplished, which is worth mentioning, is the fact that we will add from 15-20 new members to this branch. Leland Bass has already signed up quite a few and has sent out membership blanks to those who requested them.

I am enclosing a program, giving you a general idea of our meeting. Perhaps the menu will make you hungry.

I sincerely hope that we can again soon have the pleasure of having you at one of our meetings in the near future.

Mrs. Binai and myself again extend our sincere and warm regards to you and your family.

Yours very truly,
WALTER R. BINAI

Thank you, Mr. Binai. Mr. Hogaboom in a telephone conversation spoke very highly of your interesting and well attended meeting. This is the first of such meetings held in your city; we are pleased to know that it was so successful.

On Friday evening, March 13, the President of the A.E.S., Mr. E. T. Candee, Mr. George Wagner, 2nd. vice-president, and the Executive Secretary, visited Lancaster Branch regular meeting. President Gilbert from York, Pa., presided. There was a fine attendance. Mr. L. W. Burton of General Electric Co. spoke on Copper Oxide Rectifiers. Many questions were asked which proves that this subject is of ever increasing interest at platers' meetings. Mr. Burton gave a clear and understandable explanation to all those who were in doubt regarding the use of rectifiers as compared with M.G. sets. The officers of the Supreme Society spoke on different phases of the national organization.

The Executive Secretary heartily commended Mrs. Gladys Ford, wife of one of the members of Lancaster Branch for her splendid work in producing the artistic design in the monthly posters that are sent to each member. We thank Mrs. Ford herewith for her interest in the Branch and declare her to

be one of the most active members in the A.E.S. We were glad of this privilege of visiting Lancaster Branch as we were on our way to attend the research meeting at Pittsburgh and the annual meeting of the Pittsburgh Branch which was held the following day.

Mr. Harry Misner, foreman plater with the Max Wocher & Son Co. writes us that Cincinnati Branch intends to make a drive for increased membership and to encourage the present members to attend the meetings. It is possible also that a regional meeting of the various branches around Cincinnati will be held there next year.

Thank you for your letter, Harry. Cincinnati has the material to do things with.

We appreciate the fine letter from Al Foreman who is pinch hitting for Mr. Gannon, the Secretary.

Mr. Foreman's letter is as follows:

"The meeting of March 26 was one of the best attended of the year. About every plater and plating supply man in Cincinnati attended, also many out of town men connected in some way with plating. Due to a change of positions Mr. Knoepfler, our president, was absent and Mr. Harry Misner presided. Harry gave the visitors a very good talk about the A.E.S. and some of the older platers that had not attended a platers' meeting for years got their eyes open a little. Even now we should get a few new members since plating has been curtailed. The A.E.S. should be the place for anyone connected with plating in any way, for their own good. This was proven at the meeting at which the speaker was a Mr. Abbott of the War Production Board on Priority Divisions. Some of the members had many interesting questions which were answered by Mr. Abbott. Other questions were answered by members of the Branch, which proved that if you attend A.E.S. meetings, you can keep up with the times.

"Harry Misner has been putting on a membership campaign. He is one of Cincinnati's hardest workers, along with Mr. Ehlen and Mr. Knoepfler. The members attended a joint meeting in Indianapolis and reported having a good time, and hope for more meetings like them. Our old friend Mr. Owen Towner came down from Chicago to join them at Indianapolis which in itself was a pleasure. Attention was called to the new service of the tin branch which is a central file for all platers in our branch. Information in any type of finishing or plating or any other help needed by a member is given. We hope this will be an extra inducement for members if we can only keep going now due to the new orders of the OPM."

The Research meeting at Pittsburgh was held March 14, at the University Club. President Sohn presiding. Much routine business was discussed. A very interesting report was given by our associate at the Bureau, Mr. Gerald A. Lux.

Chairman Sohn called the attention of the members to the fact that for several years back, the research program has been supported by manufacturers, supply house men and equipment makers. He further stated that he believes the members of the Platers Society who receive direct benefit from the results of the Research program should by all means share in the work being done at the Bureau of Standards. Mr. Sohn's remarks in this connection were heartily approved. A drive for funds from the members of the branches will be undertaken soon. At the close of the meeting we had the pleasure of visiting Mr. Taylorson's Lab. where high speed plating was demonstrated.

The annual meeting of Pittsburgh branch was held in the Auditorium of beautiful Mellon Institute.

Mr. Dimon presided and introduced the speakers, Gerald A. Lux, Frank A. Mesle, and Dr. R. O. Hull and Frank MacIntyre. Both of these gentlemen discussed and demonstrated the practical value of the Hull cell as an aid to the plater in finding out the cause of his solution troubles. All speakers were thanked heartily before the meeting adjourned. About seventy sat down to a well prepared turkey dinner at 7:30. Short addresses were made by Pres. Candee, Vice Pres. Wagner and others. Mr. Stanley Hedden, president of

TROMEX resists breakdown because it contains specially-developed, new stabilizing inhibitors *that prevent acid formation* (rather than neutralize acid after it has formed). These improved inhibitors are themselves not affected by acids in cutting oils.

With **TROMEX** in your degreasing machines, work is delivered to the plating or finishing rooms chemically clean . . . right down into the pores of the metal, parts are completely oil and grease-free.

TROMEX works equally well on aluminum, magnesium and heavyweight metals. Our jobbers will gladly advise on the availability of stocks for use in essential industries.

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TROMEX is different. In its formulation, new inhibitors were developed to prevent solvent breakdown (rather than to neutralize acid products of decomposition after they have formed). With TROMEX on the job, acid build-up never becomes a problem because the inhibitors in TROMEX resist acid formation and are not themselves affected by acids in cutting oils.
TROMEX is equally efficient on aluminum, magnesium and all heavyweight metals. Our jobbers will gladly advise on the availability of local stocks for essential industries.
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NEW ENGLAND REGIONAL MEETING

SATURDAY, APRIL 25, 1942
HOTEL HIGHLAND, SPRINGFIELD

Educational Session 2:30 P. M. Banquet at 7:00 P. M.

E. H. Bucy, Atlas Powder Co.
Organic Finishing Materials in War Time.

G. B. Hogaboom, War Production Board.
Present Status of Electroplating.

A. J. Rosenthal, Supt. of Finishing, Underwood Elliott Fisher Co., Hartford
Polishing and Buffing from a Practical Standpoint.

Austin Fletcher, Supt. of Finishing, Brener Titcheur Corp., Binghamton, N. Y.
Hard Chrome Plating.

Tickets $3.00 **Bring the Ladies**

the Branch thanked all present for their attendance and invited all back to Pittsburgh again to share in their annual meeting.

Boston Branch of the A.E.S. held its 7th Annual Technical Session and Banquet at the Hotel Statler, Saturday, March 28. More than 200 members and friends from all over New England attended the educational session in the afternoon. The Branch Librarian, Louis V (for victory) Gagnon of the United Carr Fastner Corp. presided, and George P. Swift of M.I.T. and 2nd Vice-President took charge of discussions.

The program was opened with an address by the President of Boston Branch, William Jones of United Carr Fastner Corp. At the end of his talk the assembly stood in silence with bowed heads in honor of those who have given their lives for our country in this war.

The first speaker of the afternoon, Selwyn Cooper of the Zapon Division of the Atlas Powder Co. discussed the difficulties encountered in obtaining materials for organic finishing. He also stressed the shortage of containers for lacquers and enamels, and suggested that those who handle these materials for finishing save as many empty containers as possible.

Mr. Frank Mesle of Oneida, Ltd. the second speaker, gave a very timely talk on silver plating for defense uses. His exhibit of bearings plated with 50-60 thousandths of an inch of silver created much interest.

The general chairman of the Banquet Committee, Joe Barron of M. E. Baker Co. next spoke a few words of welcome to our out of town guests and he was immediately followed by the Supreme President Ellsworth T. Candee of the American Brass Co. Mr. Candee spoke of the A.E.S. Research Committee and expressed hope that the sponsors of the committee would continue their financial support. He also expressed regret that our executive secretary, Bill Kennedy, was ill and unable to be present.

The next speaker was George B. Hogaboom, now of the W.P.B., always a favorite of Boston audiences. The meeting was deeply impressed by his inspiring talk on the future of our industry.

The final talk on the program was given jointly by R. O. Hull and Frank McInytre of the Du Pont Co. Mr. Hull discussed the use of the plating cell bearing his name, and illustrated his talk with slides. Mr. McIntyre then took over for an informal discussion and demonstration of the practical value of the Hull cell as an aid to the electroplater. The demonstration was received with enthusiasm, and many samples from local plating solutions were tested. The discussion would be going on yet if it had not been broken up by the chairman at 6:30 P. M. after five hours of technical session.

At 7:00 P. M. more than 300 people attended one of the finest Banquets and floor shows that Boston Branch has ever presented. After the entertainment the Branch saluted its only secretary in the 22 years of its existence,

Rochester — Buffalo

JOINT ANNUAL 21st SPRING EDUCATIONAL MEETING AND DINNER DANCE

Rochester, N. Y. — Saturday, April 18th.

Educational Program — 2:00 **Dinner Dance** — 7:00 P. M.

SPEAKERS

2:00 P. M. — "Physical Methods of Testing Baths"
By — Mr. R. O. Hull, Chief Research Chemist of the Grasselli Dept. of DuPont at Cleveland, assisted by Mr. Frank MacIntyre, Chemist.

3:00 P. M. "Recent Developments in the Use of Activated Carbon for Electroplating Solutions."
By — Mr. W. A. Helbig, Chemical Engineer, Sales Dept., Darco Corp.

4:00 P. M. — "Some Plating Problems"
By — Mr. Gustaf Soderberg, Chemical Engineer, The Udylite Corp.

At 7:00 P. M. we are having our Dinner and Dance with a floor show and a grand orchestra.

Tickets $2.50 per person

Reservations — write Mr. Ernest or Michael Fasson, 594 Smith St., Rochester, N. Y.

Andy Garrett of the Gillette Co. Joe Barron presented him with a lounging robe with the best wishes of the Branch. Dancing continued until midnight and a grand time was had by all. Gifts were distributed to all the ladies with the compliments of the M. E. Baker Co. and the Magnuson Products Corp.

Some of the notables present besides the speakers were, Dr. Walter Meyer, Dave Clarin, John Costigan, Mike Shacat, Earl Couch, Frederick Allen, John Oberender, Wes Cassell, and many, many others.

Editor of the MONTHLY REVIEW
Dear Mr. Kennedy:

The purpose of our Society is to promote the industry of metal finishing, to increase the value of our service by knowledge of approved methods of the various operations for preparation, protection and decoration of the surface of metal objects, to establish standards of quality and advise the procedure best used to obtain these standards.

The proposal to change the name of the Platers' Society is in recognition of change that has happened, the old name is no longer descriptive and it is suggested that a name that would better indicate our objective of better finishing and better protection of metals by standard approved methods would attract to our Society many valuable members whose interest and our own are the same.

Electro-plating has become a complex industry, the information required extends to what is under the plate, the alloy or composition and the treatment in preparation of the metal for plating, the subsequent finishing and the various processes before or after plating and in many cases the substitution of chemical treatment without the electric current.

The foreman plater is interested in the practical applications of many methods of metal finishing and needs information from the technician to properly direct the various operations.

Careful consideration by the members should be given to any proposal that is intended to increase the value of the Society, to the industry and themselves, progress under present conditions seems vital to the country.

Yours very truly,
ART METAL FINISHING CO.
F. F. PIERDON.

NEW..

JUST OFF THE PRESS

Get your copy now. This new 16-page Bulletin on the Improved 1942 Semi-Automatic Heavy Duty Plating Conveyor contains 49 large, clear illustrations. Close-up pictures show details of construction and improved features based on constant engineering research. Included are the types of drives used, a wide range of heavy duty carriers, methods of ventilation and motion plating.

Leadership in the creation, development and manufacture of electroplating equipment for many years makes Hanson-Van Winkle-Munning Company the logical source of information on electroplating and polishing equipment and supplies.

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H-VW-M three types of lathes cover a wide range of buffing and finishing requirements including every Metal Finishing Victory Need. All these lathes are carefully engineered, compactly built and ruggedly constructed. Design eliminates vibration, assuring —

SMOOTH PERFORMANCE AND LONG LIFE

Spindle drives are through heavy duty, high speed V-belts, which can be quickly changed without disturbing spindle bearings or alignment. Spindle speeds of 1800 to 3600 RPM can be provided. Other features are V-belt tension adjustment and lock, automatic spindle brake, bronze spindle nuts, continuous duty A.W.M.A. motor with magnetic starter and tray for tools.

H-VW-M TYPE M 1 LATHE

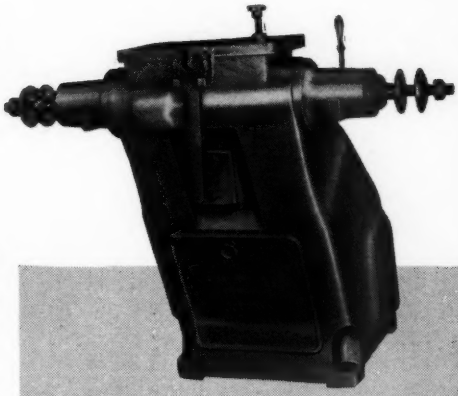
For heavy duty work, Motor is mounted inside base, furnished in 3, 5, 7 1/2 and 10 HP sizes for 220-440 and 550 volt, 2 or 3 phase, 60 cycle power circuit. Also supplied special for other A.C. or D.C. circuits.

H-VW-M TYPE MO LATHE

Designed for a range of work not requiring heavy duty machine. Standard specifications include 3, 5, and 7 1/2 HP for 220, 440 and 550 volt, 2 or 3 phase, 60 cycle power circuit. Can be specially supplied for other A.C. or D.C. circuits. Motor is mounted outside of base.

H-VW-M TYPE MS LATHE

Motor in base comes in 3, 5, 7 1/2 HP, Voltages 220, 440 and 550. Two and three phase 60 cycle power circuit.



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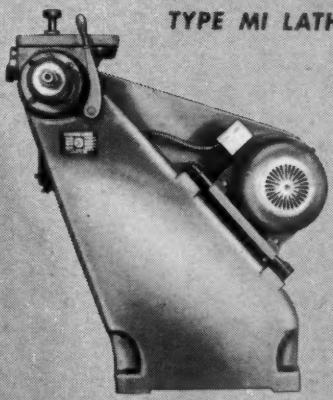

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Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

Newark Branch held its regular meeting on Friday evening, February 20, 1942, at the Hotel Robert Treat, Newark, N. J. The meeting was called to order at 8:30 p.m., by vice-president, William T. Bruhns, who presided in the absence of our president, due to his employment of strategic importance. At the roll call of officers all except our president and secretary-treasurer were present, but they attended the meeting near its closing so that all officers may be counted present. The minutes of the previous meeting were read and approved.

Numerous communication requests for our Year Book were read and the secretary was instructed to comply with the requests as Newark Branch feels honored to have such a valuable book.

Applications for Joseph Barile and Gerard Rosania were voted to take the regular course for investigation by the Board of Managers. There was no balloting of candidates.

Under the report of Committees, Mr. Horace H. Smith reported that the Banquet and Educational Committee have decided upon the important parts of the program, and that another meeting will complete what is thought will be a successful Annual gathering.

Under the heading of unfinished business, the discussion of "What Do You Think?", which appeared in the January issue of THE MONTHLY REVIEW (page 74) and on which discussions were started at our previous meeting, were continued. This meeting was well attended as the subject mentioned was stressed in the announcement of the meeting. After a lengthy and heated discussion of this subject a motion was made and seconded and was unanimously carried to retain the name of the society as it stands. An amendment to the motion on the proposal was voted and seconded that the Secretary submit to THE MONTHLY REVIEW, for publication, Newark Branch's attitude on "What Do You Think?"

The Amendment reads as follows:

That the Newark Branch, A.E.S., has carefully and wisely discussed the issue of "What Do You Think?"

Be it resolved that the preamble of our constitution, second paragraph, is broad enough to cover any changes that may be desired.

That the Newark Branch is unanimously and definitely opposed to any changes in the name of the society.

That this amendment be published in THE MONTHLY REVIEW for the purpose of other branches to be so informed of our stand.

The speaker scheduled for the evening was our good friend "Cyanide Bill", but due to his recuperating from pneumonia, Mr. H. H. Blouch of E. I. du Pont de Nemours & Co. substituted for him. His talk was of interest and very timely on the subject "The Importance of Electro Tinning in the Defense Program". Many questions were asked and a rising vote of thanks was given to the speaker. A Question Box was conducted and the speaker also contributed to the questions. Many thanks to the du Pont representative.

Poised and Ready

The busy executive expects quick action when he gets ready to "give a letter". He sees to it that everything in his department clicks. The production departments, not so closely under his observation, are ambitious to click in the same manner. They can do it if their equipment is properly built, and kept in condition. Stortswelded fabrications have the stamina built into them that keeps production moving. . . at the end of one shift they're ready for the next.

STORTS WELDING COMPANY

42 Stone Street **Meriden, Conn.**

Manufacturers of Welded Fabrications to Specification

There were seventy members present and the meeting adjourned at 11:30 p.m.

JOHN B. KOTCHES, *Secy. pro-tem.*

Boston Branch meeting was called to order with Vice-Pres. Swift in the chair. The minutes of the previous meeting were read and approved. Communications were read, placed on file. Bills were read, ordered paid. Four applications were read, and approved by the board of managers as follows: Henry W. Moon, 564 E. First St. South Boston, Mass. Active; Harry M. Roberts, 7 Boynton St. Clinton, Mass. Active; Everett J. Baer, 48 Birch St. Clinton, Mass. Active; and Ralph J. Capalbo, 43 Hammond St. Worcester, Mass. Active.

Joe Barron reports that plans for the Banquet are complete and will be one of the best ever held by the Branch. Louis Gagnon spoke of the Educational Session as one of the best yet.

The meeting was then turned over to the Librarian, Louis Gagnon, he had as the speaker of the evening, Dr. Gray of the Du Pont Co. His subject was "Lead Plating". He explained the workings of the solution and gave different formulas that are being worked today. This is a coming finish and should interest every one in the plating game. He answered all the questions for the members and was given a rising vote of thanks. The answers and questions will be published in this REVIEW.

Colgate Gilbert, Everett Ryan and Ralph McCahan discussed priorities, on how to go after them. Meeting adjourned at 10:45 P. M.

A. W. GARRETT, *Secy.*

Providence-Attleboro Branch held its January meeting on Thursday, the 19th, at the Providence-Biltmore Hotel. After a short and uneventful business meeting the speaker of the evening was introduced.

We were fortunate to hear from Dr. William S. Murray, President of the Indium Corporation of America who spoke to us on the subject of "Indium and Indium Plating for Decorative and Functional Designs."

Dr. Murray gave us a short history of the metal, which is an element derived from ore and often found with zinc ores. It is readily soluble in hydrochloric acid and alloys easily with lead, zinc, cadmium, copper, silver and many other metals. Normally one such metal is used beneath indium.

Indium is easy to deposit from cyanide solutions, using a stabilizing assistant such as sugar. Low current densities, low voltages are the rule. Throwing power is excellent. Standard practice in applying this metal in-

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cludes a fusion at a 350 degree F. temperature. Usual appearance of deposit before fusion is a dull gray, but after fusion a light polishing operation brings out a soft gray color not unlike silver.

This metal is highly resistant to corrosion and discoloration which indicates that it will eventually find a valuable place in decorative finishes. It has fine reflectivity also.

Indium is highly regarded for ability to reduce friction of metal to metal bearing surfaces and is finding a large field in the aviation field at present. There is an ample supply of the ore now above ground and a seemingly ample source in the United States for years ahead.

Dr. Murray was thanked heartily.

F. E. ALLEN, *Secy.*

Detroit Branch held its regular monthly meeting at the Hotel Statler on Friday, March 6, 1942 with Pres. Walter L. Pinner presiding.

Dr. Walter R. Meyer was the speaker of the evening. As Editor of *Metal Finishing* Magazine, he has a very broad outlook of things of interest to the plating industry. In a very comprehensive way he spoke on the shortages of critical metals and illustrated this with slide pictures showing sources, imports, exports and consumption of these metals on a world-wide scale. His talk also covered the way in which the War Production Board is handling this situation by a complex system of priorities. He then gave a short talk on the effects of cadmium plating on articles which come in contact with food. As a closing topic he gave a resume of what has been done in anodizing aluminum.

These three subjects gave the members ample food for thought which was reflected in the large number of questions which turned up in the Question Box. Mr. Hahn, Librarian, disposed of these easily with the assistance of Dr. Meyer and Messrs. Lewis, Kinnaman and W. W. Wilson who served on the Board of Experts.

WARREN I GRIMMER, *Secy.*

Rochester Branch held its February meeting as a Joint meeting with the Society of Metals at the University of Rochester. on Monday night Feb. 23rd. The guest speaker was Mr. Paul Pine of the Harshaw Chemical Co. The subject "Latest Developments in Silver, Iron, Lead and Tin Plating." Mr. Pine gave an excellent talk which was attended by about 90 joint members. He stated that new uses will be found for iron plating and predicted that the ingenuity of the platers will make them develop new

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processes in plating that will be available. The following were mentioned.

A. Iron Plating

1. Iron plating to rebuild worn parts and heat treating to required hardness.
2. Sulphate cake can be used to make solution along with some Ammonium Sulphate. Sulphate cake is a very cheap source of iron.

B. Silver Plating

1. A new development was shown. Samples of silver plated material covered with a clear and colored lead silicate low fixed enamel which can be applied with a spray gun before fixing for only 2-5 minutes at 800 degrees C. The samples were very beautiful and the silver showed thru on the clear enamel and showed a beautiful highlight on the light green and colored enamels.

C. Tin Plating

1. About six new full automatic electrotinning units for making tin plate are in process of being installed. Electrodeposited tin plate is less porous than rolled tin plate and consumes only 1/3 as much tin. Electrodeposition of tin can save 2/3 of tin used for making tin plate.

In other words new processes of plating for defense will take the place of the plating formerly used only for decorative purposes.

P. J. LOPRESTI, *Secy.*

Chicago Branch held its regular monthly meeting Friday Mar. 13, at the Atlantic Hotel, President C. Kelly presiding, and all other Officers present. The applications of Mr. H. Cohn. & Mr. E. H. McCoy were read and committees appointed on same. Mr. V. E. VanStone, J. A. Schwiderski, R. M. Fiandt, & I. Cohen. were elected to associate membership. Mr. E. O. Brady, H. O. Anderson, E. J. Driscoll, & A. Sykes were elected to active membership. A letter from Indianapolis Branch regarding their Educational meeting and Banquet was read and placed on file.

Mr. R. Hazucha, chairman of the committee to get Photographs for the Grand Rapids convention, of former conventions, and other events of interest to the A.E.S. asks that any members who have these Photographs please get in touch with him, so that Chicago branch can be well represented at this Display.

President Kelly appointed the following nominating committee for our April 10th election of Officers. Mr. C. Clindinin, C. Kocour, G. Holmgren, H. A. Gilbertson, G. Westerberg, & O. Weickmann.

Mr. V. Mattacotti introduced the

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Nickel Plating Solution

The one bath especially designed for plating WHITE METAL ALLOYS including ZINC, LEAD and ALUMINUM.

STAN-O-LEAD

Tin-lead alloy bath for corrosion resistance. Ideal for steel, copper or brass that is to be soldered.

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guest speaker of the evening, Dr. Cotton of the Delco-Remy Co. and a member of the Anderson Branch. Dr. Cotton gave a very fine and interesting talk on *Hard Chrome Plating* explaining the many things that make for success in this type of chrome plating. Many questions were asked and the way Dr. Cotton answered them proved that he was master of his subject.

Mr. V. Mattacotti then introduced Mr. H. I. Hanson of the E. I. duPont De Nemours & Co. who furnished us with a sound motion picture "A New World Thru Chemistry" which was very interesting and instructive. There were 112 present at this meeting.

The librarian Mr. E. Woodmansee found some questions in the question box.

J. W. HANLON, *Secy.*

Grand Rapids Branch held their meeting February 13th at the Rowe Hotel.

The meeting was called to order promptly at eight o'clock by Vice President Chester W. Smith who presided at this meeting in place of Mr. Caldwell who was absent. The minutes of the January meeting were read and approved.

We had one communication from Mr. George Wagner pertaining to photographic display for the coming Convention in June asking that a chairman of the committee be appointed to collect photographs. Reports of Committees on the Banquet held in January were given.

Mr. Chester Smith gave us a report and complete review of the changes in the dates of our June Convention. Educational session is to be held three days instead of four. His report also covered the meeting of the National Convention Committee members who were here at the time of our Annual Banquet.

We had one new member elected, Mr. Bernard A. Leemhuis, and two applications for new members to be voted upon in the March meeting.

There being no further business, the meeting was then turned over to our speaker for the evening, Mr. John P. Geoghegan from the Industrial Finishes Division of the E. I. du Pont de Nemours & Co. who gave us a very instructive and pointed talk on paints and enamels for defense. His talk was very instructive and educational.

The meeting was then adjourned.

C. E. ABEL, *Secy.*

Newark Branch regular meeting was held on Friday evening, March 6, 1942, at the Hotel Robert Treat, Newark, N. J. The meeting was

ROBERTS BUFFING COMPOUNDS

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THE best quality, correct and uniformly controlled manufacturing, fair price policy and special formulas for individual demands.

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GREASE STICKS — long mileage
LIME COMPOUNDS — many formulas
EMERY PASTE — all grain sizes

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called to order at 8:30 p. m. by Vice-Pres., William T. Bruhns, who presided in the absence of our president. All other officers were present.

The minutes of the previous meeting were read and approved.

A letter from Mr. T. J. Mac Stoker, Sec'y. of the New York Branch, was read and placed on file.

An application from Mr. Edward B. Washburn of the Walter Kiddy Co. to Active Membership was voted to take the regular course.

Mr. Horace H. Smith reported further progress on our Annual Educational Session and Banquet. Mr. Robert R. Sizelove was appointed Chairman of a Fishing Committee.

Mr. George V. Galanti of the Western Electric Co. was elected to Associate Membership.

Two of our own members were the speakers for the evening. John Kotches whose subject was "Barrel Cadmium Plating," and George Klink whose subject was "Maintaining Help in the Plating Department." Both subjects were of great interest and are being forwarded to the MONTHLY REVIEW for publication. Many questions were asked on Mr. Kotches' paper and were answered by him, and verified by his stooges.

Meeting adjourned at 11 p. m.

GEORGE WAGNER, *Secy.*

Buffalo Branch regular monthly meeting was held at the Elk's Club, March 13, 1942. Joe Ruff conducting. Minutes of the last meeting were read and approved. Financial statement was made by the treasurer.

There was a short discussion concerning a Sick Committee and a motion was made by Mr. Galvin, seconded by Mr. Wernlund that a committee be appointed to send a remembrance in case of death of a member or of a member of his immediate family. Mr. Galvin and Mr. Logan were appointed in this capacity and also to act as a Sick Committee. Mr. Galvin's address is—The Galvin Machine Sales Company, 1501½ Main St., Buffalo, N. Y. Telephone No. Grant-4341. His home telephone No. is Garfield 5296.

The motion was made by Mr. Fotheringham, seconded by Mr. Wernlund, that we continue to use the Elk's Club for our meeting place.

Two guests were present and acknowledged by the group. Mr. Merow from Oaks and Berger of Cattaraugus, New York, also Mr. Ray Bergholtz from the Rochester Branch. This meeting was then turned over to H. L. Benner who gave us a talk with colored slides which were made at the Colonial Radio Company. After the slides, he gave us a talk on the general

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aspects of tin plating, noting that the war in the Pacific has cut off about 60% of our tin supply. Although tin is rather expensive in plating, the amounts used are very small thus making it economical. In all, about 180,000 tons are used per year. Only a small portion of this is used in plating. The plated metal is used mostly for food containers, refrigerator evaporators and plated piston service. There are 2 types of tin baths; the acid bath and the stannate bath. The stannate is the most widely used because of its better throwing power. In spite of that the acid bath is faster, having an efficiency of about 100%, whereas the stannate has an efficiency of only about 40% to 50%. Mr. Oplinger has obtained a patent on a stannate bath using sodium stannate and acetate. A stannate bath used commercially was given as follows:

Sodium Stannate—12 to 16 ozs. per gallon;

Sodium Hydroxide—1 to 3 ozs. per gallon;

Sodium Acetate—2 to 4 ozs. per gallon:

Hydrogen Peroxide—1 8 oz. per gallon.

Operating conditions are 10 to 30 amps per square foot on the cathode and 15 to 40 amps on the anode, operating temperature 165 to 175°F. with an optimum of 168°. The stannate bath was controlled visually by the anode which should be a canary yellow. If too much sodium hydroxide is in the bath, tin is dissolved as stanus tin, giving a grayish color to the anode. Too little sodium hydroxide results in the precipitation of insoluble tin salts. Excess sodium hydroxide is reduced by an addition of acetic acid. The operation of this bath usually requires daily additions of sodium hydroxide, and hydrogen peroxide. This bath gives a semi-bright lustre. There are really no bright tin solutions. After Mr. Benner finished his talk there was a lively discussion among the members and several questions were asked of Mr. Benner, in which it was brought out that a salt spray test was not used as an indication of the value of a tin plate but rather the porosity test. Tin can be plated on most metals but it will not take a satisfactory chrome plate. Due to priorities, tin plating has reduced approximately 50% except for essentials, including food containers. Mr. Benner was given a rising vote of thanks for his talk by all the members. Mr. Wernlund announced that there would be no regular meeting in April because of the joint meeting in Rochester and then the meeting was adjourned by the President, Mr. Ruff.

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Los Angeles Branch March meeting opened with Raymond Baugh of Los Angeles and Frank R. Curtis of Adelaide, Australia being elected to membership of the Society. The application of W. J. Finnigan for membership was turned over to the Board of Managers for investigation.

Mr. M. D. Rynkofs, Chairman of the Educational Session and Banquet, committee reported that all of the details of the coming affair were being rounded into shape and every indication pointed to a highly successful occasion in spite of the unfavorable condition of business.

Mr. ApRoberts, who is in charge of Exhibits for our Branch reported that he has been very successful in obtaining exhibits of plated work and substitute finishes to be placed on display.

Considerable interest was expressed by the members as to what action had been taken or is to be taken by the Society in promoting National Defense through encouragement in the use of plated finishes to resist corrosion and wear.

The meeting was then turned over to Mr. Holman, our librarian who presented Stanley Rynkofs, speaker of the evening who spoke on "Modern Silver Plating Procedure." Mr. Rynkofs pointed out that the silver might be used to replace some of the scarcer metals in plating at this time.

After this paper had been discussed the questions in the Question Box were answered and then the meeting was adjourned.

ERVIN FRAUENHOFF, *Secy.*

Syracuse Branch March meeting was held on Friday March 13th in Bowne Hall at the University. About 35 were out.

The meeting was called to order at eight P. M. by Mr. Dwight Overcash our President. Minutes of the February meeting were briefly reviewed and letters read regarding photographs at the Convention instead of exhibits. Also a letter from our President Mr. Candee promising to be on hand in April to present us with our permanent Charter. Mr. Kennedy has promised to be at that meeting also.

Mr. Overcash announced with regret that our very energetic Librarian, Angelo Giorgi, had left the fair city of Syracuse for the wilds of Washington having accepted a position with the Bureau of Mines. We all feel that our loss is Harold's gain and we all wish him the success he deserves. After a little political finagling on the part

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of George Lawrence, Paul Swartz of the L. C. Smith & Corona Co. was elected Librarian to everyones entire satisfaction. He is certainly the handsomest member of our "Heirarchy." We all know of his interest in A.E.S. affairs and his ability so we know we have picked the right man for this very important office.

We had a visit from one of the officers of the local chapter of the American Society of Metals, this was on invitation of our Branch to explain to us in some detail their activities in aiding small manufacturers in their metal problems particularly in the war effort. Mr. Parmalee of that Society outlined to us very clearly what they had in mind and were doing. We assured them of our fullest cooperation in anything we can do along the same lines. The two Societies do seem to be quite close and we are sure that a mutual cooperativeness will help a lot in our war effort.

Mr. Overcash then called on our Research Associate Mr. Gerry Lux who with Mr. Frank Mesle dropped in on their way to Pittsburgh. Mr. Lux gave us a brief summary of his activities over at Divine Brothers in Utica on the research polishing project that was set up a year ago. We were glad to get this surprise visit and we are hoping that we shall see more of him (Syracuse is only fifty miles from Utica, Gerry).

After all these distinguished visitors were given their courtesies we finally got around to the paper of the evening and Mr. Overcash introduced one of his gang, Mr. J. J. Tierney, who read us a paper on some work done at the General Motors plant here in Syracuse on "Carbonate Removal." It turned out to be a very interesting paper and very ably presented causing plenty of discussion. I think this paper should

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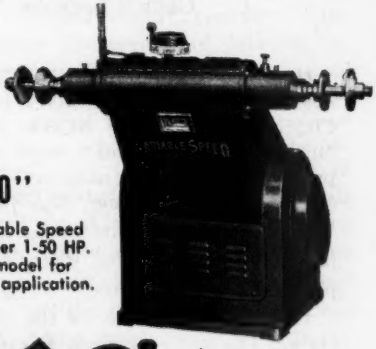

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be published in the REVIEW as I am sure it has a lot in it of interest to all our members.

Three applications were received at this meeting and will follow the usual procedure.

Mr. Overcash announced a speaker from the F. B. Stevens Co. who will be on hand at our next meeting. We are hoping to show the Convention picture at this meeting.

Meeting adjourned at 11 P. M.

GEORGE SIMMONS, *Secy.*

Hartford Branch held its March meeting at the Hartford Electric Light Co., Hartford, Conn., March 16th. Nineteen members and friends were present. Four new members were elected and one transfer, Mr. James Warren of Buffalo Branch, was voted favorably. Mr. Stanley Blatoz's application was voted upon.

The principal speaker of the evening was Doctor Crit Pharris, Doctor of Industrial Hygiene for the State of Connecticut. His topic "Health Problems in Plating Operations and Metal Finishing." Mr. A. L. Coleman, Chief Industrial Hygienist demonstrated some of the apparatus used in testing some of the hazards encountered in this work.

Dr. Pharris described briefly the causes of "Silicosis". Continual inhaling of free silica from high silica buffing compositions where the suction hoods are not working properly might lead to this condition. Silica dust of less than 5 microns in diameter is very dangerous in high concentrations. Hot alkali cleaners, especially electric cleaners cause some irritation to the skin and possibly to the nose, eyes, and lungs. Alkali burns are sometimes dangerous and should be watched. Vapor degreasers cause a degreasing action of the skin and under some conditions are very toxic. This action is very similar to chloroform and might cause nausea, dizziness and axphyxiation in extreme cases. When cleaning these tanks respiratory protection should be used. So called "cheap jags" are an indication of escaping fumes. Sometimes workers in other parts of the room are affected if concentration of fumes is high enough. The use of Benzol for cold solvent is very dangerous as this vapor is extremely toxic. Acid pickling is dangerous if allowed to come in contact with the acid itself and the nitrous oxide fumes from bright dips are also very toxic. The spray from chrome plating tanks is apt to form ulcers of the nose tissue and very slow to heal. The fumes from Cadmium plating are not considered very dangerous but fumes from the metal itself, in the case of fumes caused by burning the metal or grinding the metal are very dangerous. In one particular case where workmen attempted to burn off plate on the side of a tank a ten minute exposure to the fumes caused death. A

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number of cases of cadmium poisoning from cadmium plated ice trays were cited. Nickel plating causes so called Nickel Itch in some cases. Some workmen are extremely allergic and should be transferred to other work if possible. Lacquer thinners cause trouble at times.

In order to control some of this trouble workmen should be very careful regarding their personal hygiene. Gloves should be used at times, protective creams are helpful if right types are used and respiratory protection should be used in extreme cases.

Mr. Coleman explained some of the hazards of Carbon Monoxide gas, as this has no odor and is extremely dangerous. High concentration of Sulphur Dioxide will gradually cause the sense of smell to be deadened and disastrous results might result. Sand blast operators must be protected and good ventilation in spray booths is very necessary. In these days of substitution for scarce products the use of Benzol instead of Toluol should be guarded against. Mr. Coleman showed a continuous Carbon Monoxide Test outfit along with a dust impinger and apparatus for determining Benzol content in the air. He had also numerous types of dust masks on display.

A very instructive evening for the interested members present.

APLEY N. AUSTIN, *Secy.*

Baltimore-Washington Branch held a regular meeting on March 7 at the Stafford Hotel, Baltimore, Md. After a dinner and business meeting, Dr. William Murray, president of the Indium Corporation of America, initiated us into the possibilities, actual and potential, of indium plating. Showing samples to illustrate, he pointed out many advantages that can be obtained from very small amounts of indium plated on non-ferrous metals and diffused into a surface alloy by a light heat treatment. In view of the drastic curtailment of many important plating metals, such suggestions are indeed timely, and Dr. Murray well deserved the vote of thanks given him. The business meeting was highlighted by a motion by Mr. Huston that this branch sponsor an amendment to the constitution providing that the name of the Society be changed

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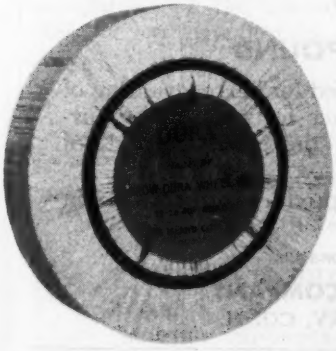

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and that its scope be enlarged to include metal finishers as well as platers. After a lively discussion pro and con, the motion was approved and a committee was appointed to draft the amendment for presentation at the annual convention, also the election of eight new members and receipt of four new applications brought us within hailing distance of our goal of 100% increase in membership.

C. T. THOMAS, *Secy.*

Toronto Branch held its regular meeting on March 6 in the King Edward Hotel. Mr. John Acheson opened the meeting in the absence of president Jim Graham and told the members this was probably the last meeting to be held in the King Edward as a larger and more elaborate hall had been engaged in the Royal York and that our meetings would be held on the second Friday instead of the first, which was satisfactory to the 45 members present.

The main topic of the evening was to be a demonstration of the Hull Cell, by Mr. Allan Byers. Two applications were balloted on and Mr. Victor F. Allen and Mr. D. H. Wyatt were elected into membership.

Tom Boaz and Allan Byers gave a final report of the card and dance party to be held on the 20th. Tom O'Keefe who will handle the card end of this affair reminded the members about the prizes and stated this annual affair was becoming larger and the gifts for the prizes could not be too many.

Secretary Byers was instructed by a vote of the members to purchase a Victory Bond for $300 dollars.

Nominations for the next election of officers took place and apparently there will be quite a change.

Chairman Acheson called Mr. Byers to give his talk on the Hull cell. This was interesting as Allan is a good speaker and showed efficiency in the handling of the different anode and cathode; showing charts of the different concentrations, mentioning temperature amperage, and the various solutions. The members showed appreciation with a hearty vote of thanks.

In view were a few nickel plated malleable castings and John Acheson submitted a large door hinge that was Cobalt plated by Mr. Walter Barrows 25 years ago and it looked an excellent job.

JAMES S. CAIRNS, *Secy.*

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Toledo Branch regular meeting of the A.E.S. was held at the Macomber High School, on Thursday, Feb. 5th with 15 members present.

The President, Mr. Vannorsdall opened the meeting at 8:00 o'clock P. M. Minutes of the previous meeting were approved as read, a letter from Mr. Wagner concerning exhibits was read and passed over without any comment, also a letter from Mr. Kennedy to Mr. Shank was read. A motion by Mr. Weiker that the Branch should write a letter of inquiry to the National Society, asking for a clarification on the nickel situation, and how it will affect us after April the 1st. was passed. It was also proposed that if it is true that no metallic nickel whether primary or secondary, or in any form may be used for plating after April 1st on non-defense work, that the American Electroplating Society should protest to the Government, explaining that the degree of unemployment resulting therefrom would greatly offset the small percentage of nickel saved through such enforcement.

At this time Mr. Hunlock lead a discussion on plating defense work, many interesting points were brought out during this discussion, some of them being quite important to the plater. After a short discussion on brass plating for the adhesion of rubber, the meeting adjourned, 10:30 o'clock P. M.

G. P. H. BERGEMAN, *Secy.*

Waterbury Branch held its regular meeting Friday, March 13th in the Colonial Room of the Hotel Elton. Dinner was served at 6:30 P.M., Carl Kilborn winning the drawing from the attendance cards returned. The technical session opened at 8:00 P.M. with forty-three in attendance.

President Ralph Colter called attention to the Regional Meeting of New England Branches to be held in Springfield, April 25th. This promises to be an interesting meeting, and all the members of the Branch should make a special effort to attend.

The monthly business meeting of the Branch will be held at the home of W. D. Starr in Watertown, March 25th.

Emile Beloin, substituting for Roy Anderson, as Technical Chairman introduced Dr. Dubpernell in his regular monthly book review. The book reviewed this month was the French revision of O. Macchia's book, "Chromium Electroplating." Unfortunately the index was left out of this edition which seriously limits the usefulness of the book. However it covers the subject of Chrome plating quite thoroughly and is well illustrated, although it does not go into the subject of hard chrome plating which is important at this time.

An interesting film produced by the Bureau of Mines, picturing "The Mineral Resources and Scenery of Arizona," was next on the program.

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"Up to the Minute Developments in Barrel Finishing," was the subject of the talk given by Mr. William Harding of the Benrus Watch Company. Mr. Harding brought a glass tumbling barrel with him to demonstrate what happens when rolling work. Through the exhaustive work he has done he has been able to produce some excellent finishes by rolling and the members present felt that the demonstration and discussion were of immense practical value.

At the end of the meeting Mr. Harding was extended a rising vote of thanks from an appreciative audience.

S. L. HENN, *Secy.*

Montreal Branch held its regular monthly meeting in the Mt. Royal Hotel, Monday, Feb. 2nd., 1942. The meeting was called to order by Vice President Lunn.

The Chairman of the Membership Committee, Mr. J. Reisenberg, spoke on Membership Drive, advising every member to try and bring a prospective Member to a Meeting without any obligation to them, and thus do our part in helping to raise the total Membership of the Society to 3000, which the Supreme Executive hopes to attain.

The subject, re-changing the name of the Society was also brought up and well discussed and put to a vote. The majority did not approve of it, the main reason being, that the time allotted at the meetings is fully required to cover Plating alone.

The Librarian, Mr. E. H. Marsh, then put questions to the Members and asked their ideas of an anwer, after an allotted time the 2nd. question was put forward and so on until the Meeting was called at 11 o'clock. Vice Pres. Lunn then thanked Mr. Marsh for his novel idea and hoped he would continue to make his lectures as interesting as this one.

EUGENE FEELEY, *Secy.*

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Montreal Branch held its regular monthly meeting, Monday, March 2nd at 8:15 P.M. at the Mount Royal Hotel. The meeting was called to order by Vice President F. R. Lunn.

Mr. Reisenberg's (Lea Products Co.) idea together with the able cooperation of all members proved beneficial with a large attendance of prospective members, and members. 8 new applications were read and voted on and the Secretary was advised to forward these to the Supreme Secretary.

Past Supreme Pres. J. H. Feeley drew the Branch's attention to the fine spirit shown by Newark Branch in the buying of War Bonds—Many thanks Newark we have some now.

The meeting was turned over to our Librarian Mr. Marsh (Union Screen Plate Co.) who spoke on the difficulties encountered in arriving at a definite cost price on Hard Chrome Plating and heavy build up of other metals for War Work, such as the making up of special jigs, inside anodes, etc., and an understanding with the manufacturer as to just what service the article has to

give and how it will stand up under conditions called upon. He then drew blackboard sketches of different dies, explaining troubles he came in contact with to plate recesses and how to overcome them. A number of questions were asked and our Librarian handled them quite ably. We all know he is capable in this regard. The meeting adjourned at 11 o'clock with a rising vote of thanks to our energetic Librarian who is one hard worker Montreal Branch appreciate.

EUGENE FEELEY, *Secy.*

Philadelphia Branch held its March meeting at the University of Pennsylvania, Harrison Lab., 34th & Spruce Sts., Philadelphia, Pa., the 4th Friday, March 27, 1942. President Harry Keller opened the meeting at 8:40 P. M. with the roll-call of officers, 1st Vice-President Verelle and Librarian Zurbach absentees.

Due to the illness of the Librarian; the new committee, Geo. Gehling, Albert Hirsch, and Henry Orlik, functioned by procuring a speaker for the evening. President Keller introduced the speaker of the evening, Mr. L. W. Burton, of the General Electric Co.; whose subject was "Copper-Oxide Rectifiers".

Mr. Burton gave a short history of the Rectifier and the present method of manufacturing. A very efficient description of the important parts of the rectifier was given; also, prints of hook-ups necessary to the operations so well known to the plating industry.

The Speaker also stressed the flexible use in the present emergency, namely, anodizing; then, their use later as separate plating units, if desired.

Many questions were answered as to voltage, methods of hook-ups, and efficiency. President Keller led in a rising vote of thanks to the Speaker, Mr. Burton.

A full compliment of officers and delegates were nominated; nominations were closed, to be reopened at the next meeting and then the annual election. Wm. A. Ross, active, was elected to membership after endorsement by the Board of Managers. The application of Charles Stehli, active, was referred to the Board of Managers. Several communications were read. Motions were made to receive and file them.

Motion by J. E. Underwood and seconded by Henry Orlik—That a basket of fruit and a get well card be sent to the Librarian Gene Zurbach Jr. Carried.

The bills were ordered paid and then adjournment at 10:30 P. M.

PAUL MENTZER, *Secy.*

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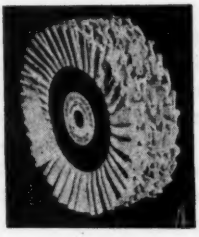

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Grand Rapids Branch held its regular meeting March 13th. The meeting was called to order by our President, Maurice Caldwell, promptly at eight o'clock. Attendance would approximate 30 members and guests.

The minutes of the previous meeting were read and approved and reports of committees given. Mr. Chester W. Smith, National Convention Chairman, gave us an analysis and complete report of the National Convention work which has been done at present, together with tentative outline of the program naming the speakers already engaged, with the promise this year's Convention held by this Branch would proceed with the changes that have been made. He also called to our attention a new feature of our Convention, of the first annual photographic display of the A.E.S., a complete outline of which will be received in letters to the members of April 3rd.

Two new members were elected for membership, Mr. William E. Daugherty, Active Member, and Mr. Edwin Wright, Active Member. One application was presented for election.

There being no further business, the meeting was then turned over to Mr. Ivan C. Hepfer who introduced the speaker for the evening, Mr. Sidney G. Lammers, paint consultant from Grand Rapids, who gave a very interesting and instructive talk on "Industrial Organic Finishing." His talk covered the choice of materials, preparation of base metal, application of the finish, and also approved methods of evaluating and setting organic finishes.

He discussed in detail practical tests for comparing the properties of organic finishes such as gloss, adhesion, hardness, flexibility, hiding power, grease resistance, moisture resistance, and film thickness. A very interesting discussion followed his talk.

The meeting was then adjourned.

C. E. ABEL, *Secy.*

THE QUESTION BOX

Grand Rapids Branch

The question box contained the following questions which were answered after considerable discussion.

1. *What makes work coming from a Jetal Bath turn red?*

Ans. Improper or insufficient rinsing.

2. *What is the objection to using the hydrofluosilicic acid bath for hard chrome plating?*

Ans. Iron contamination causes the bath to become inoperative much sooner than it does in a sulfate bath.

3. *Are there any methods of salvaging lacquers that have jelled or kicked out?*

Ans. Each specific case should be studied but in general there is no practical method.

4. *How do you determine spray efficiency?*

Ans. Spray a quantity of the parts on which the spray efficiency is to be determined, keeping accurate record of the paint used. Measure accurately the film thickness on a number of finished parts. From the average film thickness, area of parts sprayed, and the actual coverage figure for the paint used, which can be obtained from the paint manufacturer, determine the theoretical amount of paint that would

be required to cover the parts. Divide this figure by the actual amount of paint used and the result multiplied by 100 is equal to the spray efficiency.

5. *Which is the better brightener to use in a cadmium plating solution, Pet milk or Postum?*

Ans. Some thought that Postum was the better, while an equal number thought Pet milk to be the better.

C. E. ABEL, *Secy.*

Los Angeles Branch

1. *How much heat must be applied to soldered steel or brass to bake transparent porcelain enamel over a gold deposit?*

Ans. An enamel such as is used in the finish described requires 1500½ F. for 5 min.

2. *Legally, how long can we continue to do nickel plating?*

Ans. Impossible to say, however it will probably depend on what kind of work is being done.

ERVIN FRAUENHOFF, *Sec-Treas.*

Boston Branch

1. *What is the current density used in the sulfuric acid anodizing process?*

A. Generally speaking 12 amps./ft. 2 but it may vary with the concentration of the anodizing bath.

2. *Is it absolutely necessary to cover the anodized aluminum with an organic coating for a serviceable finish?*

A. No, anodized aluminum is an excellent finish with no coating or it may be dyed. On an article such as a cigarette case (which the questioner had in mind) an organic coating is not required.

3. *How are small parts such as rivets anodized?*

A. In the sulfuric acid process

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these parts are packed tightly into syntlane baskets with a center rod of aluminum as a contact.

The cover is forced on jamming the parts into contact with each other. The electrolyte is forced through the baskets which gives even distribution and prevents overheating. Ordinarily about 0.0004" can be put on in 30 minutes. In this method rejects usually run around 5%.

4. *Can A.C. current be used for anodizing?*

A. A.C. current has been used. The thickness of an anodized coating is a function of the ampere-minutes used. Since A.C. gives only half as much usable as A.C. the process requires twice the time. Controlling stray currents has caused a serious problem in attempting to use A.C.

5. *How hard is an anodized coating?*

A. An anodized coating 0.0004" thick has a hardness of 7.5 on Mho's scale.

6. *Are both chromic and sulfuric anodizing baths allowed by the army and navy?*

A. Yes, with two exceptions. On aluminum containing above a specified % copper, the chromic acid bath is not permitted and on parts which might entrap solution the sulfuric bath is not acceptable.

7. *Is sealing of the anodized coatings always necessary?*

A. Aluminum anodized in the sulfuric bath must be sealed. Anodized parts from the chromic acid bath require no sealing.

8. *What is the place of the Alrok process in the defense or war program?*

A. Alrok has been accepted by the army and navy for certain applications. It is coming into more general use and due to the shortage of anodizing capacities will probably gain more widespread use.

9. *What are the comparative costs of Alrok and anodizing?*

A. The cost of Alrok is only around 10-15% of the cost of anodizing.

10. *Can Alrok be used on parts to be heat treated?*

A. Alrok is not recommended for this application.

11. *Is Alrok serviceable enough for articles in general use such as screws, etc.?*

A. Yes, it is a serviceable coating that will stand mild usage. It is an excellent paint or other organic coating base.

12. *How can the anodized coatings be inspected?*

A. If processed with dichromate

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sealer the yellow color will identify all parts that are anodized.

13. *Is the range of 5-10% chromic acid anodizing bath patented?*

A. No, the patented chromic acid solution is the 3% chromic acid Bengough & Stuart bath which is controlled by Alcoa.

14. *Has anyone been successful in plating aluminum or other metals?*

A. This is still in the curiosity stage.

15. *What metals can be plated on aluminum?*

A. Any metal that can be plated.

16. *Can anodizing be done with 12 volts?*

A. Since the coating thickness is a function of the amperer minutes, that pass through the work a lower voltage will require larger time. Sulfuric acid may attack the aluminum if the work is left in the bath too long.

17. *What are the comparative salt spray ratings of Alrok and anodized coatings?*

A. No difference is noted up to 250 hours, after this Alrok will begin to break down. Parts from the chromic and sulphuric baths are about on a par and stand up almost indefinitely.

18. *Why are most airplane factories using chromic acid anodizing baths?*

A. When the Bengough & Stuart 3% chromic acid process became popular the aircraft factories developed a chromic acid anodizing process outside the patented range and thus were able to use it without license. The equipment is somewhat different than that required for the sulfuric acid bath and they are still using the equipment on hand. However, in a great many cases new anodizing capacity is for the sulfuric bath. Although the sulfuric acid bath requires cooling and sealing it uses a lower current density; it is harder and it can be colored.

A. W. GARRETT, *Secy.*

Los Angeles Branch

1. *Consintine Iron alloy thermocouple parts show rust spots though a silver plate after being in service a short time. How can this be prevented?*

Ans. Silver plate should be .0002 in. thick. Then fire at 1500°F. for 3 min.

2. *What is the composition of a noncorrosive solder flux for use on silver plated brass parts?*

Ans. Recommended flux, 1 part Muriatic Acid, 160 parts Glycerine.

3. *What is the composition of Allegheny Metal?*

Ans. 18-8 Stainless Steel.

4. *What is the coffee colored sludge that accumulates in the bottom of a silver solution?*

Ans. The sludge is just dirt and can be filtered out.

ERVIN FRAUENHOFF, *Secy.*

Syracuse Branch

1. *Can food containers be plated with cadmium?*

Ans. No. Cadmium should never be used where it may come in contact with food as cadmium is poisonous.

2. *Is it possible to plate .0005 or .0006 in. of cadmium in 8 or 10 minutes? What current density?*

Ans. It may be possible but the deposit would probably not be very satisfactory. 29 amps./sq. ft. for 10 min. will deposit .0005 cadmium.

3. *Work plated in a standard zinc solution has dark spots. Raising the current density eliminates spots but gives a rough deposit. What is wrong with this solution?*

Ans. Solution must be analyzed to find what is wrong.

4. *What is a good solution for lead plating?*

Ans.

Lead carbonate.....20 oz. per. gal.
Hydrofluoric acid (50%) 32 oz. per. gal.

Boric Acid.....14 oz. per. gal.
Glue.....0.025 oz. per. gal.

5. *Could a battery charger with a capacity of 6 volts at 4-6 amps. be used for experimental plating?*

Ans. Yes, though a storage battery would be better.

6. *What kind of tank is best for a 15% hydrofluoric solution?*

Ans. Wood, pitch lined or a lead tank would be O. K.

GEORGE SIMMONS, *Secy.*

Detroit Branch held a question box at their regular meeting on March 6th. A Board of Advisors, consisting of Mr. R B. Kinnaman, Mr. W. W. Wilson, and Mr. B. F. Lewis were assisted by Dr. Walter Meyer, the speaker of the evening.

1. *Can some material be substituted for tin for selective nitriding?*

Ans. Probably some oxide such as the currently popular black finish or nickel plating might be used. An alloy of tin might also prove useful.

2. *Is it desirable to remove the natural oxide film from aluminum before anodizing?*

Ans. It would probably be desirable but certainly is not necessary.

3. *Will you discuss briefly the hydrogen embrittlement of spring steel by acid dipping? How serious is it in electroplating and what can be done to avoid it?*

Ans. Spring steel can be definitely embrittled by acid dipping. The degree of embrittlement is influenced by length of time of dipping, impurities in acid dip, and temperature of dip. The seriousness of this subject is very ably discussed in the 1940 proceedings of the A.E.S. by Zapffe and Faust. Anyone interested in this subject would do well to study this report.

4. *How can copper be recovered from a copper strip using hot sodium cyanide solution as stripping medium?*

Ans. If this were done electrolytically, one could probably use copper cathodes on which the copper would deposit after sufficient concentration of copper had been built up in the solution. If not done in this manner, one might use the solution until it stops stripping, due to saturation and then use the solution for makeup in copper plating solution. However, one should check for impurities which might be harmful before doing this.

5. *May spent chrome anodizing solution be used in a Chromium plating solution?*

Ans. Due to the nature of the impurities, this would probably not be advisable.

6. *At what rate must the vo tage be increased in Chromic acid anodizing?*

Ans. The voltage must not be increased so rapidly as to overload the generator. Otherwise there is probably no definite rule to follow.

7. *What work has been done on electro-depositing silver cadmium alloy?*

Ans. Cadmium silver alloy has been plated for many years in the silver plating industry. Whether this was done to cheapen the coating or for other benefits was not definitely known. Dr. Faust of the Batelle Institute, I believe, has done considerable work on this subject.

8. *What is the cathode efficiency of a standard barrel nickel solution?*

Ans. This is largely dependent on the composition of the solution and may vary between possibly 70% and 98%.

EDGAR A. HAHN, *Librarian.*

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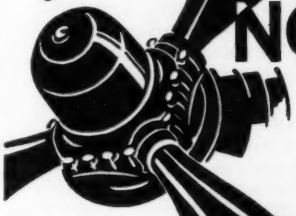

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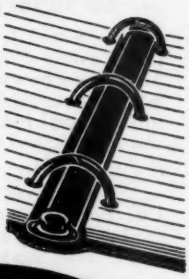

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REPORT OF THE 1942 EDUCATIONAL SESSION AND DINNER DANCE OF THE LOS ANGELES BRANCH OF THE AMERICAN ELECTRO-PLATERS SOCIETY

The Annual Educational Session of the Los Angeles Branch of the A.E.S. was called to order at the Los Angeles Breakfast Club Saturday, March 21, 1942 by Mr. E. R. Holman, Librarian of the Branch, and Chairman of the Educational Session. Mr. Holman welcomed the friends and members of Los Angeles Branch to this, the Eighth Educational Session. As Mr. J. A. Raskin, Chemical Engineer of the Udylite Corporation; Detroit who was to have given the first paper of the day, "Conservation of Plating Materials" was unable to be present the paper was read by Mr. Frank Bunker of the L. H. Butcher Company, Los Angeles. As had been promised, this paper was one that hit the subject that is uppermost in every-ones mind today.

Mr. Herold J. Kroesche, Engineer of the A. J. Lynch Company spoke on "By-Passing Priority Pitfalls of the Plater with the New Vitreous Silver." Mr. Kroesche explained the advantages of this new finish and how it offered a finish that could be used in place of the plated finishes that may have to be discontinued because of shortages. In addition this finish offers colors that can be obtained in no other way, as was proven by the samples Mr. Kroesche had on display.

"Rectifiers on the Job" was the title of a paper given by Mr. J. M. Bogle, Electrical Engineer of the Udylite Corp. Mr. Bogle told of the many advantages that had been realized through the installation of rectifiers in some of the most modern plating plants in the country.

After an intermission for lunch Mr. B. G. Daw, President of La Salco, Inc., St. Louis, Mo., spoke on "What Happens Inside a Plating Barrel." Mr. Daw's talk cleared up the cause of some of the difficulties that sometimes appear in barrel plating and should help in producing better work for many of us present.

Mr. Robert R. Janssen, Process Engineer of the Noth American Aircraft Corporation, Inglewood, Calif., spoke on "Aircraft Electro-Finishing," explaining the various electro-finishes used in the aircraft industry.

Mr. J. M. Bogle returned to the platform to speak on "Stray Currents." As Mr. Bogle was well aware this subject was one which could be depended on to stir up some discussion. It will suffice to say that the discussion was enthusiastic, and enjoyed by every one.

The final paper of the day "Relation Between Tap Water and Plating Conditions," was given by Mr. J. P. ApRoberts, of Turco Products, Incorporated, Los Angeles. Mr. ApRoberts paper brought out a point in the operation of plating plants that is frequently over-looked, and one that should be given greater consideration.

The Educational Session was then adjourned.

Some time later in the evening the friends and members of Los Angeles Branch again assembled, but no longer with any thought of the problems of plating. The one thought in the mind of every one was, lets have fun—. There were no rumors even that anyone did anything else. The hall was decorated with a patriotic motif and in addition to the usual door prizes, Defense Bonds and Stamps were given.

The committee in charge of the affair this year was headed, as many of the Educational Session and Banquet Committees in the past have been, by Marcus Rynkofs, and as usual Mr. Rynkofs deserves the hearty thanks of the Branch. Assisting Mr. Rynkofs were E. Holman, Chairman of the Educational Session, and J. ApRoberts, F. Bunker, E. Wells, O. Johnson, S. Rynkofs, F. Rushton, W. R. Schuler, B. Schindler, and E. Frauenhoff.

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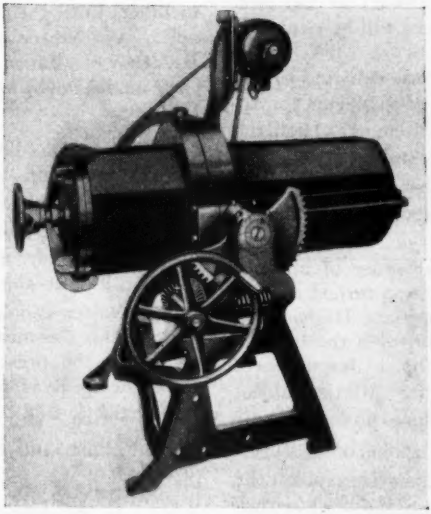

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Boston Branch met Thursday, April 2nd. at the Statler Hotel with Vice-President George Swift in the chair. Minutes of the previous meeting were read and approved. Communications were read placed on file, bills moved to be paid.

Joe Barron not being present a report on the Banquet will be made by him at the next meeting. L. Gagnon reports that the technical session was one of the best the Branch has ever held.

Boston Branch will discuss the "What Do You Think" at the next meeting; all members will be requested to attend.

One application was read and turned over to the board of managers for approval, Bernard Olsen, 17 Highland Street, Revere, Mass. Walter L. Larsson a member of Providence Branch was accepted as a member of Boston Branch.

After the regular order of business was over the chair was turned over to L. Gagnon the Librarian. He had two speakers both members of the Branch, George Swift his subject "Impurities of Metals" and Arthur Mintie subject "What Takes Place in a Plating Barrel". He first spoke on Burnishing and plating barrels giving the formula for barrel plating. After this, three reels of pictures were shown, two on how work can be done in plating barrels the right and wrong way. The other picture taken by Burt Daw at the convention last June. It was interesting to see old faces again thanks to Burt Daw.

Both speakers answered all questions for the members and were given a vote of thanks for their interesting talks.

A. W. GARRETT *Secy.*

Indianapolis Branch held its regular meeting on March 4th, to discuss the plans made for the regional convention of the Anderson, Dayton, Cincinnati, and Indianapolis branches on the 21st of March.

The secretary's report was read and approved and also the treasurer's report. A five minute recess was set aside for the collection of dues. The membership commitee reported with the reading of the last new members accepted.

As an order of new business a motion was made and carried for (1) to pay the dues of all service men who are members until their return and (2) to notify the editor of the MONTHLY REVIEW of all men in the service so their names might appear on the honor roll.

Tom Allison, chairman of the regional convention, gave all details of the development of this proposed meeting from the joint committee meeting in Richmond, Indiana, on November 29, 1941, to the present time.

Mr. Walter Binai, in charge of the advertising committee, reported his results to the present time and also listed the speakers as follows:

(1) Geo. B. Hogaboom—"The Present, Past, and Future of Electroplating."

(2) E. L. Luaces—Toulman and Toulman, Patent Attorneys, Dayton, Ohio—"The Part Patents Play in the Field of Electroplating."

(3) Gustav Soderberg—Udylite Corp.—"Plating with Inside Anodes."

The rest of the program was given to the Question Box:

1. *How to strip tin other than using muriatic acid?*

Krentel: If the base is steel use reverse caustic.

Bruck: The above reference is to the steel pickling process of Bullard Dunn.

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Binai: If base metal is copper or brass, use muriatic acid only.

2. *How is sheet iron made by electroplating?*

Binai: Coat sheet steel with a coating of chromate, plate iron over this and then strip off the iron coat.

3. *Should you use sodium or potassium cyanide for a bright silver solution?*

Binai: No particular difference.

Krentel: Possibly more carbonate in the sodium than the potassium.

4. *How can excessive hypo be removed from solution?*

Blount: Work it out with dummy cathodes.

5. *Does aereating cause pitting in a nickel bath?*

Monagle: No. Some baths use that as a means of agitation.

Reha: Use addition agents to prevent pitting.

6. *What is the method acceptable to the War Production Board for the amount of nickel procurable on a priority?*

Reha: The metal cost should be 1/5 of the total cost of finishing the part.

7. *What material can be used for steam coils in iron plating?*

Lockwood: Glass.

Binai: Hasteloy B.

8. *Why does case hardened steel show a tendency to blister easily?*

Ross: There should be none if the work is clean.

Struckhoff: Use Bullard-Dunn Process of tin plating and stripping for cleaning.

9. *Why doesn't cadmium adhere to nickel?*

Binai: It will if work is clean.

Stinson: Use sulphuric acid to activate the base metal.

10. *Is it desirable to remove the tin deposit in the Bullard-Dunn Process before painting?*

Krentel: No, except to conserve the tin.

11. *What amount of tin plate should be used before nitriding steel?*

Bruck: Thickness should be .0002-.0004 tin.

Lockwood: Less than .0002,—The nitriding will go through, more than the .0004,—The metal will splatter on the work.

12. *What current density ranges are recommended for lead plating?*

Monagle: Dupont Lead—25-30, Hanson, Van Winkle, Munning 25.

13. *How can you rid your work of hydrogen embrittlement?*

Fisher: Heat to 400°F for three hours.

A motion was called for adjournment and approved.

Leland E. Bass, *Secy.*

Rochester Branch held its regular monthly meeting on Friday night March 27th, as a Dinner meeting at the Rochester Turn Verein. The attendance was very good. After the dinner business was dispensed with except for the election of Eugene DeWitt, 1657 South Ave., Rochester, N. Y. as an associate member. The application of John R. McGuire was then read and it was voted for this one time to dispense with the formality of publication prior to election as a member and he was elected as an associate member. The guest speaker was then introduced Mr. Derrick S. Hartshorn of the Enthone Co. whose topic was "Wetting Agents." His talk was very interesting and we hope to be able to have it published in the Review in the near future. After his talk and even during it he was bombarded with questions which he answered to every ones satisfaction. He was then given a rising vote of thanks for a very interesting and educational talk. Meeting then adjourned.

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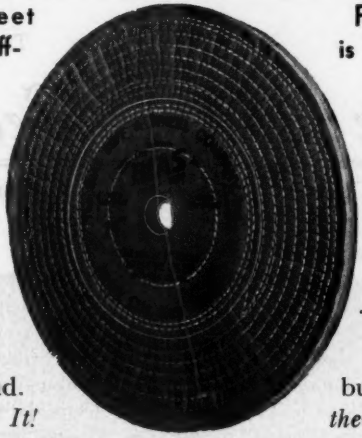

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MILWAUKEE BRANCH

This year Milwaukee Branch of the American Electro-Platers Society will foster its Annual Educational Session and Banquet on Saturday April 25.

The Educational Session begins at 2 p. m. *sharp* in the Green Room of the Schroeder Hotel and we present this program of papers and speakers for your consideration.

I. **"Some Plating Problems" which will include plating with inside anodes and stripping of deposits.**
by Gustav Soderberg, Udylite Corp., Detroit, Mich.

II. **"Silver and Indium Technic" which will be accompanied by a moving picture showing some of the processes.**
by Frank K. Savage; Conn, Limited, Elkhart, Ind.

III. **"Acid Copper Plating."**
by Walter Pinner; General Spring Bumper Division of Houdaille Hershey Corp., Detroit, Mich.

The Banquet? The Crystal Ball Room of the Schroeder at 7 p. m. Entertainment and Dancing. Tickets are $3.25 each. Please send your remittance to

Robert Steurnagel, Jr. *Treasurer*
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The Abstract Section

CHARLES C. CONLEY, *Chairman, Program and Educational Committee*

Electrodeposition of Tin from Acid Solutions. By PAUL R. PINE. *Trans. Electro-chem. Soc.* **80** (Preprint 31) (1941). Tin retains its luster in the atmosphere, has a fair protective value, and resists attack of acids in foodstuffs. It is used for coating refrigerator coils, food containers, kitchenware, etc., for protecting metal parts in storage, for bearings, etc. Tin coatings 0.0005″ thick on automobile pistons assist in "breaking-in" motors. The early development of acid tin plating is outlined. Chloride solutions were used at first; during the first World War fluosilicate baths were employed for the electro-refining of tin; gradually the fluosilicate acid was replaced by sulfuric acid with additions of cresolsulfonic acid, cresol and glue. A number of other patented addition agents are mentioned. Electro-refining of tin was abandoned in 1923 in the United States, but today two steel companies are electroplating tin on strip steel to obtain coatings thinner than are possible with hot tinning; one company finishes the product by brushing to a semi-bright or "Butler" finish, and the other fuses the electroplated tin in a hot oil bath to obtain a mirror-bright surface. Solder is manufactured by electrodepositing tin and lead together as an alloy. Compared to the alkaline bath, the acid tin bath plates two to three times faster, requires only one-tenth as much power for a given deposit, generally does not require heating, does not precipitate tin oxide as rapidly, and is more readily controlled; the throwing power is not as good, although better than that of most plating baths. The functions of the bath constituents are outlined. The average bath contains two types of addition agents: the first class comprises highly protective colloids, such as glue or gelatin, which give smoother deposits and help to hold in solution the addition agents of the second class; the latter are aromatic compounds, chiefly cresol, and prevent loose crystalline deposits while giving smooth matte plates. Sulfonated cresol in itself is not an effective addition agent, but helps to hold cresol in solution and retards the air oxidation of the stannous sulfate. A recommended formula is:

Stannous sulfate	54 g./1.
Sulfuric acid	100 g./1.
Cresol sulfonic acid	100 g./1.
B-napthol	1 g./1.
Gelatin	2 g./1.
Anode current density	less than 25 amp./sq. ft.
Cathode current density	10-40 amp./sq. ft.
Current efficiencies	95-100%
Temperature	70-80°F.

Value of throwing power and covering power are given for several tin and other metal plating baths. The acid tin solution is very conductive. Filtration is infrequently required, and the bath is not affected by the usual metal or organic impurities; copper may be removed by electrolysis at low

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current densities. Chlorides and certain organic impurities are objectionable. The addition agent can be controlled by observing the voltage, and the grain size and covering power of the deposit. Analytical methods are suggested for tin (in detail), acid, cresol, and glue. Lead or rubber-lined tanks are recommended, with air agitation from lead pipe. Pure tin anodes are used. Conventional cleaning methods are satisfactory for steel parts, but with some cast irons a strike deposit of alkaline tin or copper is needed, which may often be combined with alkaline cleaning. "In the 'tin plate' industry, it is common to refer to thickness in terms of weight per base box . . . One pound per base box is equivalent to 0.00006" of tin in thickness." Deposits 0.0001" thick have been reported to be non-porous, although the results of porosity tests do not agree in comparing deposits from acid and alkaline baths. The hot water, ferricyanide, hydrogen evolution, copper sulfate, sodium hydrogen sulfide, and salt spray tests for porosity are suggested; and for thickness, microscopic, stripping, and micrometer measurements.

ERNEST H. LYONS, JR.

Alkaline Tin Plating. By F. F. OPLINGER and FRED BAUCH. *Trans. Electrochem. Soc.* **80,** (Preprint 25) (1941). Heavy tin deposits are applied on odd shaped atricles more easily and accurately by electroplating than by hot tinning; and on non-ferrous metals, the inevitable contamination of the hot tin melt is avoided. Tin coatings are resistant to corrosion and tarnish by the atmosphere and by foodstuffs, and are used on utensils, etc., for food, on miscellaneous hardware, and on electrical equipment to be soldered. Although a number of tin plating baths have been known for many years, not until the stannate bath, with adequate control, appeared about ten years ago were results satisfactory on a large scale. The slow deposition rate, and the precipitation of tin as insoluble salts when the caustic soda is too low, or from additions of hard water, are disadvantages. The recommended compositions are:

	Still Plating	Barrel Plating
Sodium stannate	12 oz./gal.	20 oz./gal.
Caustic soda	1 oz./gal.	2.5 oz./gal.
Sodium acetate	2 oz./gal.	3 oz./gal.
Hydrogen peroxide (100 vol.)	1/16 oz./gal.	1/16 oz./gal.
Anode current density	10-40 amp./sq. ft.	
Cathode current density	10-25 amp./sq. ft.	
Anode and cathode efficiencies	60-90%	
Temperature	140-176° F.	

On increasing the cathode current density above 60 amp./sq. ft., the current efficiency drops so rapidly that the deposition rate is not much increased. The throwing power of the stannate bath is excellent. If the anodes are coated with a greenish yellow film during operation, tin dissolves as stannate; otherwise some stannate is formed, and causes spongy deposits. The anode current density required to form the film depends on the caustic soda concentration: with low caustic soda, 5 amp./sq. ft. is sufficient; with 1-2 oz./gal. caustic soda, 10-40 amp./sq. ft. is required; somewhat lower current densities are adequate to maintain the film. If the caustic soda concentration is too

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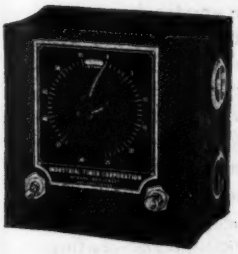

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high, the film may not be formed; if it is too low, the anodes do not dissolve adequately to maintain the metal content: careful control is therefore essential. Hydrogen peroxide is used in small amounts to oxidize any stannite which may have been formed. Filtration is difficult but generally unnecessary: impurities of lead, antimony, and arsenic are removed by electrolysis; suspended impurities by settling and decantation. Sodium resinate or oleate may be used to restrain spray. Anodes are of pure tin. On aluminium, tin will deposit by immersion unless the sodium stannate and caustic soda are kept low. For non-porous coatings on steel, a thickness of 0.00075″ is recommended, and a minimum of 0.001″ for cast iron; 0.0003-0.0005″ coatings are generally satisfactory for brass, bronze, and copper. The hot water, ferricyanide, ammonia fume (for brass, bronze, copper), humidity, and salt spray tests are suggested for porosity; and drop tests for thickness. The Brinell hardness of electroplated tin is 8-9. The deposits have a white matte finish.

ERNEST H. LYONS, JR.

Cobalt Plating. By GUSTAF SODERBERG, W. L. PINNER and E. M. BAKER. *Trans. Electrochem. Soc.* **80,** (Preprint 32) (1941). Cobalt coatings resemble nickel coatings, but cobalt costs four times as much and is less resistant to corrosion. Cobalt replaced nickel plating in Germany during the first World War but disappeared thereafter. Cobalt-nickel alloy plates are whiter, harder, and more resistant to corrosion than either metal alone and are used for "bright nickel" plating. The first detailed study, by Kalmus, of cobalt plating led to the modern nickel bath. Both the single and double cobalt salt baths can be operated at much higher current densities (up to 163 amp./sq. ft.) than the corresponding nickel baths; the single salts of the two metals have identical solubilities, but the double cobalt salt is much more soluble than the double nickel salt. The functions of bath constituents and additions are discussed, and several bath formulas with operating data are given. In most respects, the cobalt baths closely resemble nickel baths; cobalt anodes dissolve more readily than nickel anodes. Analytical methods are given. No advantage for cobalt plating over nickel is seen, and it is not used to any extent.

ERNEST H. LYONS, JR

Anodic Polishing of Electroplated Nickel. An Investigation of the Sulfuric Acid Process. By A. W. HOTHERSALL and R. A. F. HAMMOND. *Metal Ind.* (London) **58,** 193-6, 235-6 (1941). A lustrous finish can be produced on matte nickel deposits by electrolytic treatment as anode in H_2SO_4 solution of sp. gr. 1.64. The conditions generally used are: bath temp. 86° F., c.d. 250 amp./sq. ft.; time, 0.5 to 2.5 min. A wide range of conditions is possible, however, and improvement is possible by addition of glycerol, benzene, or toluene sulfonates. These reduce the bath voltage and lessen the tendency for streaky deposits. The amount of metal to be removed to give a brilliant finish varies with the roughness of the nickel deposit and the conditions of polishing. On polished brass, hard, fine-grained deposits, 0.001 in. thick, require the removal of less than 0.00005 in. of deposit, while deposits of large grain size require 0.00015 in. to be removed for a deposit 0.001 in. thick. Measurements of light reflected show that anodically pol-

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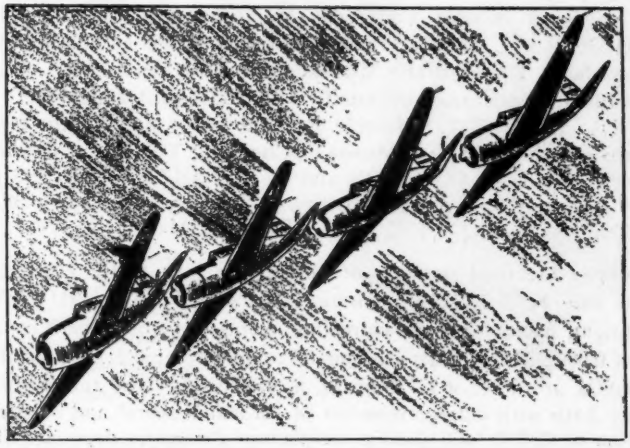

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lished nickel has a higher reflectivity than mechanically polished nickel. Very little increase in porosity of the deposit was produced by anodic polishing.
H. STOERTZ. *Chemical Abstracts.*

Thickness of Anodic Coatings on Aluminum. By JUNIUS D. EDWARDS. *Proc. Am. Soc. Testing Materials* **40,** 959-66 (1940). **Anodic Coatings Seen Through the Microscope.** By F. KELLER. *Ibid.* 948-58. **Abrasion Resistance of Anodic Coatings on Aluminum.** By H. G. ARLT. *Ibid.* 967-77. **Electric Breakdown of Anodically Oxidized Coatings on Aluminum: A Means of Checking Thickness of Anodized Finishes.** By K. G. COMPTON and A. MENDIZZA. *Ibid.* 978-87. A series of papers on testing anodic coatings. See *Chemical Abstracts* **35,** 4289-90 (1941). ERNEST H. LYONS, JR.

Theory of Electrodeposition of Chromium. By SYED HUSAIN. *J. Osmania univ.* **8,** 21-4 (1940); *Chemical Abstracts* **35,** 5394 (1941). A tenacious, bright, white deposit of chromium is obtained from a bath containing 20 cc. of 0.0002 M $Cr_2(SO_4)_3$ solution, 80 cc. of saturated K_2SO_4 and 17.5 cc. of N H_2SO_4, at a c. d. of 1.7 amp./sq. ft. and 104°F. The author concludes that any bath with a large reservoir of chromium metal and a small concentration of Cr^{+++} will yield a satisfactory chromium deposit. Chromic acid baths as well as this dilute chromic sulfate bath, suppressed by K_2SO_4, meet these requirements. ERNEST H. LYONS, JR.

Copper Sulfate from Scrap Copper. C. J. VAN HULSSEN. *Ings Nederland.-Indie* **7,** No. 11, VII, 2 pp. (1940). A simple method is given for electrolytic preparation of $CuSO_4$ from scrap copper. Strip lead cathode and anodes are separated by a porous partition; 5 to 15% H_2SO_4; c.d., 1 amp./sq. ft., 50-60 v., 12 hrs., 15.6 lbs. copper scrap used, 3.3 lbs. dissolved. The salt obtained was 97.3% $CuSO_4.5H_2O$.
B. J. C. VAN DER HOVEN. *Chemical Abstracts.*

The Hanson-Van Winkle-Munning Company of Matawan, N. J., has issued a new booklet which includes specifications for electrodeposited coatings of zinc, cadmium and nickel on steel; nickel and chromium on copper and copper base alloys; nickel and chromium on zinc and zinc base alloys; also methods of testing for local thickness of electrodeposited coatings. These are the tentative specifications of the American Society for Testing Materials, prepared jointly by the American Electroplaters' Society, the National Bureau of Standards and the American Society for Testing Materials.

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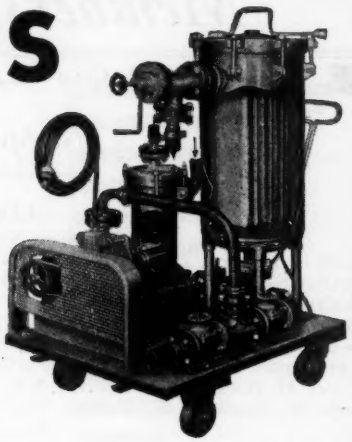

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To April 1, 1942

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Walter D. Seitz, 829 Schley Avenue, Maryland Park, Maryland Associate
Bush F. Willenborg, 914-C Street, S.E., Washington, D. C. Active
Seymour Kaplan, 3343-17th Street, N.W., Washington, D. C. Associate
Christopher M. Keller, 1124 Morse St., N.E., Washington, D. C. Associate
Frank H. Bock, 647 Eye Street, S.E., Washington, D. C. Active
John W. Shanklin, 607 Daniels Street, Colmar Manor, Md. Associate

Boston Branch

Ralph J. Capalbo, 43 Hammond St., Worcester, Mass. Active
Harry M. Roberts, 7 Boynton St., Clinton, Mass. Active
Everett J. Baer, 48 Birch St., Clinton, Mass. Active
Henry W. Moon, Clifford Mfg. Co., South Boston, Mass. Active

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Edward N. Marlette, 223 Minnesota Ave., Buffalo, N. Y. Active

Chicago Branch

V. E. Van Stone, 1035 Wenonah Ave., Oak Park, Illinois Associate
J. A. Schwiderski, 3263 W. Wrightwood Ave., Chicago, Ill. Associate
R. M. Fiandt, c/o C. G. Conn Ltd. (Plating Dept.) Elkhart, Ind. Associate
I. Cohen, c/o American Buff Co., 711 W. Lake St., Chicago, Illinois Associate
E. O. Brady, c/o South Side Plating Co., Elkhart, Indiana Active
H. O. Anderson, R.F.D. Route No. 2, St. Paul, Minnesota Active
E. J. Driscoll, 842 N. Troy Street, Chicago, Illinois Active
A. Sykes, 972 W. 18th Street, Chicago, Illinois Active

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James F. Herr, 120 Glynn Ct., Detroit, Michigan Associate

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Savin Zavarella, 84 Darlin Street, East Hartford, Conn. Associate

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Los Angeles Branch

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Frank R. Curtis, Box 858G G. P. O., Adelaide, S. Australia Associate

MEMBERSHIP CAMPAIGN REPORT

Branch	May 1, 1941	Change in Membership	Percent Change
Balt.-Washington	43	+33½	+77.9
Hartford	48	+18½	+38.5
Toronto	66	+16	+24.3
Montreal	29	+7	+24.1
Dayton	79	+18½	+23.4
San Francisco	38	+8	+21.1
Buffalo	49	+9½	+19.4
Indianapolis	39	+7½	+19.2
Grand Rapids	77	+14½	+18.8
Pittsburgh	43	+7½	+17.4
Newark	136	+21½	+15.8
New York	121	+18	+14.9
Boston	102	+15	+14.7
Prov.-Attleboro	44	+5	+11.4
Bridgeport	72	+7½	+10.4
Waterbury	87	+7½	+ 8.6
Chicago	234	+18½	+ 7.9
Rochester	76	+5½	+ 7.2
Detroit	260	+15	+ 5.8
New Haven	100	+4	+ 4.0
Milwaukee	92	+3	+ 3.3
St. Louis	79	+1	+ 1.3
Cleveland	80	+1	+ 1.3
Los Angeles	121	0	0.0
Springfield	69	—1	— 1.4
Lancaster	44	—1	— 2.3
Anderson	40	—1½	— 3.8
Toledo	44	—2	— 4.5
Philadelphia	150	—8	— 5.3
Binghamton	22	—1½	— 6.8
Cincinnati	53	—4	— 7.5

NOTE: Honorary members are included with each Branch.

MEMBERSHIP — May 1st, 1941 = 2537
MEMBERSHIP — April 1st, 1942 = 2781
GAIN IN MEMBERSHIP 244
GAIN = 9.6%

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Howard H. Chase, New Process Gear Corp., 500 Plum St., Syracuse, N. Y. Associate
Robert John Colvin, 510 Warren St., Fayetteville, N. Y. Associate

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David Paul Wilczynski, 604 Waverly Ave., Toledo, Ohio Active

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D. H. Wyatt, Western Clock Co., Ltd., Peterboro, Ont., Canada Active

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Herbert L. Padgett, 4329 Longfellow St., Jacksonville, Florida Active

Boston Branch

Henry W. Moon, 564 E. First St., South Boston, Mass. Active
Harry M. Roberts, 7 Boynton St., Clinton, Mass. Active
Everett J. Baer, 48 Birch St., Clinton, Mass. Active
Ralph J. Capalbo, 43 Hammond St., Worcester, Mass. Active

Buffalo Branch

Donald Rice, 350 Potomac, Buffalo, New York Active

Chicago Branch

E. H. McCoy, 4756 Drexel Blvd., Chicago, Illinois Associate
H. Cohn, 3117 Argyle St., Chicago, Illinois Associate

Detroit Branch

Elwood H. Mead, 4038 St. Clair, Detroit, Michigan Associate
P. Sauder, Box 185, Fraser, Michigan Active

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Edwin Wright, 613 E. Dowland Street, Ludington, Mich. Active
W. E. Daugherty, Junifer Hills, Ludington, Mich. Active

Hartford Branch

Stanley Blatoz, 26 Erwin Place, New Britain, Conn. Associate

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Joseph Barile, 32 Colden Street, Newark, New Jersey Associate
Gerard Rosania, 191 Brookdale Ave., Newark, New Jersey Associate
Edward B. Washburn, c/o Walter Kiddy Co., Newark, N. J. Active